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ENVIRON

October 17, 2007

FILE COPY

Mr. Richard Lange
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

Re: Phase II Remedial Investigation Work Plan, Revision 1
OU3: Former Plant Site Area, Upland Portion of the Southeast Area, and Bluff Area
DePue Site, DePue, Illinois

Dear Mr. Lange:

Please find enclosed two copies of the proposed Phase II Remedial Investigation (RI) Work Plan, Revision 1, for the Former Plant Site Area and the Upland Portion of the Southeast Area. In addition, two copies of the Phase II RI Work Plan, Revision 1, have been sent to your LaSalle, Illinois office.

If you have any questions or comments on the enclosed document, please do not hesitate to contact Mark Travers or me.

Sincerely,

ENVIRON International Corporation

Angela E. DeDolph

Angela E. DeDolph, P.E.
Project Manager

Enclosure

RECEIVED
OCT 19 2007
IEPA-BOL-FSRS

cc: Kevin Philips – Ecology and Environment (2 copies)
Joe Abel – ExxonMobil Corporation
Jeff Groy – CBS Operations Inc.
Steve Walker – Terra Environmental Services
Mark Travers – ENVIRON International Corporation

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OCT 22 2007
REVIEWER MD

WORK PLAN
FOR
PHASE II REMEDIAL INVESTIGATION
OU3: ON-SITE SOILS AND GROUNDWATER
REVISION 1

DePue Site
DePue, Illinois

Submitted to

Illinois Environmental Protection Agency

Prepared by

ENVIRON International Corporation
123 North Wacker Drive, Suite 250
Chicago, IL 60606

On Behalf of

The DePue Group

October 2007

CONTENTS

CONTENTS
(continued)

CONTENTS
(continued)

TABLES

FIGURES

APPENDIX

ACRONYMS AND ABBREVIATIONS

AVS	acid volatile sulfide
amsl	above mean sea level
BOLA	Base of the Lower Aquifer
bgs	below ground surface
CAMU	Corrective Action Management Unit
CBS	CBS Operations Inc.
CERCLA	Comprehensive Emergency Response, Compensation and Liability Act of 1980
CRBSC	Conservative Risk-Based Screening Criteria
DePue Group	ExxonMobil Corporation, Horsehead Industries, Inc., and CBS Operations Inc., formerly known as Viacom International Inc. (collectively)
DAP	Diammonium phosphate
DMP	Data Management Plan
DO	dissolved oxygen
ECOPC	Ecological Constituent of Potential Concern
ENVIRON	ENVIRON International Corporation
ERA	Ecological Risk Assessment
ExxonMobil	ExxonMobil Corporation
FFS	Focused Feasibility Study
FPSA	Former Plant Site Area
FRI	Focused Remedial Investigation
FRI/FFS	Focused Remedial Investigation/Focused Feasibility Study
FS	Feasibility Study
FSP	Field Sampling Plan
gpm	gallons per minute
HASP	Health and Safety Plan
HCT	Humidity Cell Testing
HCOPC	Human Health Constituent of Potential Concern
HHRA	Human Health Risk Assessment
Horsehead	Horsehead Industries, Inc.
IAC	Illinois Administrative Code
ICO	Interim Consent Order
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
IRM	iron-rich material
ISGS	Illinois State Geological Survey
ISWS	Illinois State Water Survey
IWTP	Interim Water Treatment Plant
Mobil	Mobil Chemical Corporation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NAG	Net Acid Generating
NPDES	National Pollution Discharge Elimination System
ORP	Oxidation-Reduction Potential
OUs	Operable Units
PNA	Polynuclear aromatic

QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SAP	Site Assessment Plan
SARA	Superfund Amendments and Reauthorization Act
SPLP	Synthetic Precipitation Leaching Procedure
TCLP	Toxicity Characteristic LeachingProcedure
TOLA	Top of the Lower Aquifer
UPSEA	Upland Portion of Southeast Area
USEPA	United States Environmental Protection Agency
UWBZ	upper water-bearing zone
Viacom	Viacom International, Inc.
VPCDA	Vanadium Pentoxide Catalyst Disposal Area
XRD	X-ray diffraction

1.0 OVERVIEW

1.1 Introduction

This document presents a scope of work for a Phase II Remedial Investigation (RI) for the Former Plant Site Area (FPSA) and Upland Portion of the Southeast Area (UPSEA) of the DePue Site (the "Phase II RI Work Plan, Revision 1"). The "study area" for the Phase II RI includes the FPSA and the UPSEA. The study area for Phase II RI also includes groundwater and subsurface soil in the area between the FPSA and State Highway 29, known as the Bluff Area. The initial work plan was prepared and submitted in August 2006. A series of comments were provided by the Illinois Environmental Protection Agency (IEPA). The responses to these comments are contained in a series of letters, which are included in Appendix A. This Phase II RI Work Plan, Revision 1 has been prepared so that there is one comprehensive document that contains the final scope of work based on the resolution of the comments.

Information regarding the site history, prior investigations and results, and completed response actions can be found in the *Revised Phase I Remedial Investigation Report for the Former Plant Site and Upland Portion of the Southeast Area* (ENVIRON, 2006) (the "Revised Phase I RI Report") and the various work plans, reports, and addenda prepared prior to submittal of the Revised Phase I RI Report. The relevant information included in those documents is incorporated by reference in this Phase II RI Work Plan, Revision 1.

This Phase II RI Work Plan, Revision 1 has been prepared by ENVIRON International Corporation (ENVIRON) on behalf of ExxonMobil Corporation (ExxonMobil); CBS Operations Inc. (CBS), formerly known as Viacom International Inc. (Viacom); and Horsehead Industries, Inc. (Horsehead), collectively referred to as the "DePue Group."

The DePue Site is located in the Village of DePue, Bureau County, Illinois (Figures 1-1 through 1-3). The IEPA has organized the DePue Site into the following five operable units (OUs):

- OU1: South Ditch sediments,
- OU2: The Phosphogypsum Stack,
- OU3: The FPSA and UPSEA,
- OU4: Off-Site Soils, and
- OU5: DePue Lake sediments and the associated floodplain.

The focus of this Phase II RI Work Plan, Revision 1 is to complete the RI of the FPSA and UPSEA (OU3), and to conduct an RI of the Bluff Area (OU3 for groundwater and subsurface soils).

Investigations and response actions for the South Ditch sediment (OU1) have been completed in accordance with a Record of Decision (ROD). The response actions specified in the ROD were completed in 2005. The Phosphogypsum Stack Area (OU2) is undergoing separate

closure under the State of Illinois solid waste regulations. Off-site soils (OU4) are being addressed as part of separate remedial investigation work plans, including investigation of the surficial soil in the Bluff Area. DePue Lake and the Lowland Portion of the Southeast Area (OU5), including remaining issues related to the South Ditch (if any) are being addressed under a separate RI.

1.2 Phase II RI Objectives

The overall objectives of the Phase II RI are to address the data gaps identified in the Revised Phase I RI Report, and to provide the necessary data for definition of nature, extent, groundwater flow, and transport mechanisms and subsequently, remedy selection.

1.3 Phase II RI Work Plan, Revision 1 Organization and Overview

This Phase II RI Work Plan, Revision 1 has been prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the Superfund Amendments and Reauthorization Act (SARA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the 1988 United States Environmental Protection Agency (USEPA) guidance on Remedial Investigation/Feasibility Study (RI/FS), the Interim Consent Order (ICO), and other appropriate federal and state technical and administrative guidance, as noted. The Phase II RI Work Plan, Revision 1 contains the following sections:

Section	Contents
1. Overview	Provides a brief overview of the DePue Site, a description of how this Work Plan fits into the overall plan for addressing the DePue Site, and identification of objectives for the proposed investigations.
2. Site Description	Brief description of areas addressed in the Work Plan.
3. Summary of Remedial Investigations and Remedial Actions	Summary of completed remedial investigations and remedial actions that have been performed for the Bluff Area, FPSA, and UPSEA.
4. Data Gap Identification	Identifies the data gaps from the Revised Phase I RI Report
5. Remedial Investigation Site Characterization	Describes the specific tasks proposed to address data gaps.
6. Reporting	Identifies technical data submissions and final reporting.
7. References	Provides the references cited in the Work Plan.

Supporting documents, such as the site-wide Field Sampling Plan (FSP) (Golder, 1999b), Health and Safety Plan (HASP) (Golder, 1999c), Quality Assurance Project Plan (QAPP) (Golder, 1999d), and Data Management Plan (DMP) (Golder, 1999e), have previously been submitted and are incorporated by reference. The necessary addenda to these reports have been submitted under separate cover.

This Phase II RI Work Plan, Revision 1 outlines a scope of work for a Phase II RI of the Bluff Area, FPSA, and UPSEA. Separate companion work plans will be prepared for performing the following studies:

- Baseline Human Health Risk Assessment (HHRA) for the Bluff Area, FPSA, and UPSEA; and
- Baseline Ecological Risk Assessment (ERA) for the Bluff Area, FPSA, and the UPSEA.

2.0 SITE DESCRIPTION

The DePue Site is located in the Village of DePue, Bureau County, Illinois in Sections 25, 26, 35, and 36, of Township 16 North, Range 10 East. The location of the DePue Site is shown on Figures 1-1 through 1-3. Major features of the FPSA are the Primary Zinc Slag Pile (the "Slag Pile Area"), the Lithopone Ridges Area, the North Ditch drainage system, the former zinc and fertilizer manufacturing areas, and the Interim Water Treatment Plant (IWTP) (Figure 2-1). The study area for this Phase II RI Work Plan, Revision 1 is the Bluff Area, FPSA, and UPSEA.

The Phosphogypsum Stack Area consists of a 125-acre phosphogypsum stack, associated water management facilities and features, and surrounding owned property (Figure 1-3). The phosphogypsum stack is composed primarily of calcium sulfate produced as a byproduct from the manufacture of phosphate fertilizers. The Phosphogypsum Stack Area is located north of the study area. The Village of DePue is located to the west, south, and east of the study area. DePue Lake is a 500-acre former oxbow of the Illinois River and is located south of the study area and the Village of DePue.

2.1 Bluff Area

The Bluff Area is a steeply sloped area between the FPSA and State Highway 29 approximately 90 acres in size (Figures 1-3 and 2-1). The Bluff Area was not used for zinc processing or fertilizer operations. Only limited industrial activity took place on the Bluff Area consisting of the operation of pipelines associated with conveyance of process water between the fertilizer plant and the Phosphogypsum Stack Area in a closed-loop piping system (Terra, 1996). The Off-site Soils (OU4) investigation will include soil sampling in the Bluff Area.

2.2 Former Plant Site Area

The FPSA consists of a 136-acre, continuously fenced area located between the Bluff Area to the north and Marquette Street to the south. The FPSA was the location of historical manufacturing activities at the DePue Site. As part of Phase I RI data analysis, the FPSA was subdivided into the Western Area, Eastern Area, Slag Pile Area, and Lithopone Ridges Area (Figure 2-1). Historical manufacturing activities consisted of zinc processing and diammonium phosphate (DAP) fertilizer manufacturing. Waste disposal from manufacturing operations occurred in distinct areas (e.g., the Lithopone Ridges Area, Slag Pile Area, and Vanadium Pentoxide Catalyst Disposal Area [VPCDA]), and as general fill in the Western and Eastern Areas of the FPSA.

In accordance with the requirements of the ICO, closure of the VPCDA was completed in 1995 (Terra, 1996).

The North Ditch, a drainage channel located north of the Zinc Slag Pile Area, is the only surface water feature on the FPSA. In 1989 through 1991, the North Ditch was lined with iron-rich material (IRM) and 6 inches of crushed stone.

The slag pile rises to an elevation of approximately 520 feet above mean sea level (amsl), or roughly 50 feet above surrounding grade. The above-grade slag pile is approximately 14 acres in size, and the overall Slag Pile Area (which includes adjacent areas where slag has been placed at and below grade), covers approximately 23 acres (Figure 2-1).

The Lithopone Ridges consist of a series of narrow northwest-southeast trending parallel ridges approximately 1,000 feet in length located within the Lithopone Ridges Area, encompassing about 10 acres (Figure 2-1). The above-grade ridges stand approximately 10 feet above grade. Waste was also disposed below grade in the Lithopone Ridges Area. The Lithopone Ridges Area is bounded by the toe of the Bluff Area to the north and the North Ditch to the south.

2.3 Upland Portion of the Southeast Area

The UPSEA is located immediately south of Marquette Street, south of the eastern portion of the FPSA, and consists of fill areas with land surface elevations greater than approximately 450 feet amsl. The UPSEA is bounded to east, south, and west by low-lying wetlands that are part of OU5. The Southeast Area is approximately 25 acres in size. The UPSEA is further subdivided into the South Ditch, the General Fill Area (including two Former Settling Ponds, the Former Municipal Dump, and other fill areas), and the Railroad Corridor.

The two Former Settling Ponds are located in the southernmost portion of the UPSEA. The ponds measure approximately 55 feet (east to west) by 500 feet (north to south), and were previously used as surface impoundments for cooling and settling of natural suspended solids from non-contact cooling water. The two basins were dredged in 1994 to remove settled natural solids, and the dredged material was disposed off site (Terra, 1996).

The Former Municipal Dump and other fill areas of the UPSEA (excluding the Former Settling Ponds, but including the Settling Pond berms) compose the General Fill Area. The fill consists of soil, building debris, and residue (i.e., black sandy gravel, black gravely sand). The Former Municipal Dump is located south of Marquette Street and the Railroad Corridor and east of the South Ditch. The dump was unregulated and used by local residents to dispose of miscellaneous debris (e.g., construction debris, household waste, appliances) and may have also received fill, slag, construction debris, and other material from operations at the FPSA (Golder, 1995). The Former Municipal Dump is no longer used and has naturally revegetated.

Located immediately south of and parallel to Marquette Street is the Railroad Corridor. The Railroad Corridor traverses the UPSEA east to west and, at least in part, predates manufacturing operations at the FPSA; consequently, the original fill placed to build the Railroad Corridor is not related to the DePue Site (Golder, 2002b). Materials used to maintain the grade of

the rail bed or for ballast material have been placed by the railroad company(s) and have not been characterized.

The South Ditch, a tributary to DePue Lake, is also located in the Southeast Area. The northernmost 150 feet of the South Ditch is located in the UPSEA and the remainder of the ditch traverses marshy lowlands adjacent to DePue Lake (this area is referred to as the Lowland Portion of the Southeast Area). Investigations and response actions for the South Ditch required by the ICO were addressed as OU1 and completed in 2005. Remaining issues related to the South Ditch will be addressed as part of OU5.

2.4 Geology

This section contains a brief summary of the geology of the study area, which is described in greater detail in the Revised Phase I RI Report (ENVIRON, 2006). A conceptual geologic cross-section through the Bluff Area, the study area, and DePue Lake is shown on Figure 2-2.

The plain north of the study area and the Bluff Area is underlain by a thick sequence of unconsolidated deposits consisting of tills of the Wisconsinan Wedron Group overlying sand of the Sankoty Sand Member of the Banner Formation. The Wedron Group is truncated by the face of the Bluff Area. The Sankoty Sand may be present below the Henry Formation across the northern portion of the study area near the base of the Bluff Area, but also may be truncated in the vicinity of the Bluff Area by the Illinois River valley lowlands and associated more recent deposits.

Surficial deposits at the study area include colluvium (tentatively identified as Peyton Formation), recent alluvium (tentatively identified as Cahokia Formation) and/or lacustrine deposits (tentatively identified as Equality Formation), and peat (Grayslake Peat). The colluvium mantles the ground surface at the base of the Bluff Area and may extend for some distance onto the study area. These surficial deposits are underlain by terrace outwash deposits consisting of sand and gravel of the Henry Formation.

The study area and the White City Area of the Village of DePue occur on terraces at two different levels. These terraces likely consist of valley-train outwash deposits associated with glacial melt waters and/or deposits of the Chicago outlet river that are prevalent throughout the Illinois River Valley. Those terrace deposits are assigned to the Henry Formation. Recent alluvium is present in the flood plain of the Illinois River in the lower elevations south of the study area. Bedrock of the Carbondale or Modesto Formations underlies the surficial unconsolidated deposits at elevations of about 390 to 420 feet amsl.

2.5 Hydrogeology

The regional hydrogeologic system consists of recharge in the higher elevation plains areas north of the study area, with discharge to the Illinois River and its tributaries. On a more local scale, particularly in the unconsolidated deposits, flow is controlled by varying stratigraphy and

lithology, and the presence of deep, incised valleys cut by tributaries to the Illinois River (e.g., Negro Creek). Supplies of groundwater for industrial, municipal, domestic, and farm purposes occur in the sand and gravel valley fills in the Illinois Valley, sand and gravel beds in the glacial drift, and in deep bedrock formations.

Permeable units within the unconsolidated deposits include the Sankoty Sand, the terrace sand and gravel deposits (Henry Formation) where present, and to a lesser extent, the sand and gravel deposits in till in the upland areas (ISGS, 1973). The permeable, saturated, near-surface soil and fill materials in the study area that overlie the Henry Formation sand and gravel constitute a shallow water-bearing zone.

The tills of the Wedron Group identified by Terra (2000) in the upland areas above the study area are characterized by low permeabilities, and, therefore, limit downward infiltration to the underlying Sankoty Sand. An intermediate sand layer in the till contains isolated and apparently discontinuous zones of saturation. There is insufficient data to determine flow directions in this zone, and the areal extent and hydraulic characteristic of the unit are incompletely understood. Discharge from the sand is reported to be to the upper and lower swales located along the east side of the Phosphogypsum Stack Area (Terra, 2000).

Groundwater in the Sankoty Sand occurs under unconfined conditions at an elevation of approximately 475 feet amsl beneath the Phosphogypsum Stack Area (Terra, 2000) or approximately 5 to 15 feet beneath the base of the till. Groundwater flow directions have not been determined in work conducted to date for the Sankoty Sand, although some groundwater may discharge to the contiguous Henry Formation.

Groundwater in the study area occurs in the Henry Formation and the overlying finer-grained sediments. As part of previous investigations, two water-bearing zones were identified for the study area: a Shallow Water-Bearing Zone and an Alluvial Aquifer (Golder, 1995). The Shallow Water-Bearing Zone was associated with the presence of the Grayslake Peat and was defined as saturated soils that occur above the peat. Peat has been identified across only the general eastern portion of the study area. Saturated intervals beneath the peat, or where the peat is absent, were assigned to the Alluvial Aquifer, which extends to bedrock. The Alluvial Aquifer below the peat was defined as native sand, silt, and gravel.

It is important to note that the above descriptions of the two water-bearing zones were modified in the Revised Phase I RI Report to:

1. An Upper Water-Bearing Zone (UWBZ), corresponding to permeable saturated zones within the surficial alluvial soils and fill materials that lie above the peat and the lower permeability silt and clay soils of the recent alluvium.

2. A Lower Aquifer, corresponding to permeable saturated zones within alluvial sediments below the lower permeability silt and clay alluvial soils and contiguous with permeable outwash soils of the Henry Formation.

These descriptions of the water-bearing zones have also been used in this Phase II RI Work Plan, Revision 1.

Groundwater flow at the study area is generally southerly toward DePue Lake. Upward vertical gradients have been identified between the Lower Aquifer and the UWBZ in the southeast portion of the study area. Downward vertical gradients have been identified in shallow saturated units (where present) in the remainder of the study area and in areas north of the study area (Golder, 1995).

The North Ditch receives groundwater discharge and storm water run off. North and south of Marquette Street, groundwater from south of the Slag Pile Area is intercepted by the central and south IRM walls installed in 1989 and the north and south shallow interceptor trenches installed in 1997 (Figure 2-3). Surface water runoff from the land surface between the Slag Pile Area and Marquette Street is captured at a storm water receiver. Groundwater and surface water flow from the North Ditch, surface water from the land surface between the Slag Pile Area and Marquette Street, surface water and groundwater captured in the slag pile toe ditches, groundwater collected by the IRM drains, and groundwater collected by the shallow interceptor trenches enters the Lift Station south of Marquette Street and is pumped to the IWTP for treatment. Treated water from the IWTP is discharged to the Illinois River via the River Water Line.

3.0 SUMMARY OF REMEDIAL INVESTIGATIONS AND REMEDIAL ACTIONS

The DePue Group and its members have implemented several RIs and response actions in accordance with the requirements of the ICO. The DePue Group also has conducted "supplemental studies" and implemented response actions not specifically required by the ICO. Additional investigations have been conducted by USEPA and various Illinois state agencies. This section presents brief summaries of completed RIs, supplemental studies, and response actions conducted for the study area.

3.1 Previous Investigations

The site investigations considered to be of primary relevance to this Phase II RI Work Plan, Revision 1 are those described in the Revised Phase I RI Report (ENVIRON, 2006). More detailed information regarding previous investigations can be found in the reports listed in Section 7.0, which are incorporated by reference.

3.1.1 Data Collected through December 1995

All data that were collected prior to 1995 are described in detail and presented in the Site Assessment Plan (SAP) (Terra, 1996), as required by the ICO. The SAP contains a summary of area investigations as well as the results for laboratory analyses of samples collected by IEPA and DePue Group members in 1992 and 1993; USEPA 1993 investigations; and samples of soil, surface water, groundwater, sediment, and air collected by the DePue Group members.

Approximately 84 soil samples were collected from the study area from 1976 to 1994, including samples from the Slag Pile Area, Lithopone Ridges Area, and other fill material. The samples were analyzed for selected metals, general chemistry constituents and parameters, and selected organic constituents.

Approximately 82 groundwater samples were collected from 1978 to 1995. The samples were collected from monitoring wells located in the FPSA, the Southeast Area, and two wells located off site. The samples were analyzed for selected metals and general chemistry parameters.

Prior to December 1995, approximately 15 surface water samples were collected in the FPSA and the Southeast Area (excluding routine monitoring for discharges subject to National Pollution Discharge Elimination System [NPDES] permits and samples from the Phosphogypsum Stack Area, South Ditch, and DePue Lake). The surface water samples were collected from the North Ditch, the former settling ponds, roadside drainage features,

and background samples from Turner Lake. The surface water samples were analyzed for selected metals and other inorganic and general chemistry parameters.

Prior to the end of 1995, six samples, designated as sediment samples, had been collected by IEPA and DePue Group members from the study area; two from the east former settling pond, and four from roadside swales, (excluding samples from the South Ditch and DePue Lake). The media from which these samples were collected has been removed as part of response actions conducted after the samples were collected; consequently, the results are not relevant to current conditions. Two background sediment samples also were obtained from Turner Lake prior to 1995.

The DePue Group collected more than 900 air samples during a Perimeter Air Monitoring Program during September 1994 through October 1995, and June 1996 through September 1996.

3.1.2 Supplemental Studies Since December 1995

The DePue Group and its members have conducted a number of soil and groundwater investigations within the study area beginning in November 1997. Brief summaries of each investigation are presented in Section 1.5.2 of the Revised Phase I RI Report (ENVIRON, 2006). More detailed descriptions of the investigations and the results obtained are presented in the data Addenda (Golder, 2000; Golder, 2001a; Golder, 2001b; and Golder, 2001c), and Cumulative Phase I RI Data Report (Golder, 2002a). The Supplemental Studies included the following:

- In November 1997, Viacom collected 30 groundwater samples from 27 monitor wells on the FPSA, and 3 wells in the Southeast Area. Also, 2 surface water samples were collected from the eastern end of the North Ditch, and 4 surface water samples were collected from springs located in and near the South Ditch and near the southern boundary of the study area.

- In late March and early April 1998, Mobil Chemical Corporation (Mobil) collected 61 samples from 56 locations within the study area. Fifty-three of the locations were in the FPSA and three were in the UPSEA.

- In April 1998, Viacom collected 11 soil samples from an area south of the Lithopone Ridges.

- On May 13, 1998, 3 soil samples were collected from the footprint of a concrete pad that was being constructed to support two vertical tanks along the north wall of the former power house/maintenance building (current IWTP building).

- In December 1998, Viacom collected 7 water samples and 12 solid samples from manhole locations along an on-site buried pipeline.

- In August 1999, Viacom and Horsehead drilled 12 soil borings, collected 49 soil samples from the borings, installed 11 temporary monitoring wells, collected groundwater samples from each temporary well, and collected 2 solid samples from a sump in the former Fertilizer Plant Area.

- In August 1999, Mobil collected samples of the solid materials contained in 13 manholes, and water samples from 4 manholes, along the storm water/former process water sewers in the Smelter Area.

- In August 1999, Mobil collected 8 solid samples from 7 locations in the FPSA.

- In September and October 1999, Horsehead conducted a soil and groundwater investigation on the FPSA and the Bluff Area. Horsehead drilled 6 borings in the FPSA, collected 20 soil samples, installed 3 permanent and 3 temporary monitoring wells, and collected 6 groundwater samples. In the Bluff Area, Horsehead drilled 5 borings, collected 22 soil samples, installed 5 monitoring wells, and collected 5 groundwater samples.

- During the field investigations conducted for the Phase I RI, Mobil collected and analyzed 27 soil samples from the FPSA and two samples from the UPSEA. The samples were collected from the soil borings drilled by Golder as a part of the Phase I RI field work.

- In September 2001, ExxonMobil conducted X-ray diffraction (XRD) and electron microprobe analysis of the mineralogy of samples of material taken from the Slag Pile (Shepherd Miller, 2001). A total of 4 samples were analyzed for mineral assemblages, to identify particularly the nature of the metal-bearing materials in the slag.

- In October 2004, ENVIRON, on behalf of the DePue Group, investigated the geology, geochemistry, and geotechnical properties of the soils beneath the Corrective Action Management Unit (CAMU). The investigation consisted of the installation of four soil borings and the collection of nineteen soil samples.

3.2 Historical Remedial Actions

The DePue Group has implemented several remedial actions, summarized in Table 3-1, including site revegetation, fugitive dust inspection and control, surface water diversion, groundwater and surface water collection and treatment, and administrative controls. The major remedial actions are described below.

3.2.1 Closure of the Phosphogypsum Stack Area

In 1991, Mobil Mining notified IEPA of its intent to close the Phosphogypsum Stack Area under 35 Illinois Administrative Code (IAC) 807. Closure of the Phosphogypsum Stack Area was initiated in accordance with applicable regulations and consists of regrading the top and sides of the stack, capping the stack with suitable cover, and vegetating the surface of the stack. Regrading and vegetating of the stack was completed in the spring and summer of 2006. The Clearwater Pond, located south of the Phosphogypsum Stack Area, is still in service as part of the closed-loop system used to manage storm water and residual water associated with the stack. A treatment wetland is scheduled for construction in 2006. Closure of the Phosphogypsum Stack Area, including performance of a hydrogeologic investigation, is ongoing. The closure activities are being conducted in accordance with a Closure Plan submitted to the IEPA in 1996 pursuant to the requirements of the ICO.

3.2.2 Closure of the Vanadium Pentoxide Catalyst Disposal Area (VPCDA)

The VPCDA is located northeast of the Slag Pile (Figure 2-1). Closure of the VPCDA was initiated in 1992, completed in January 1995 and, in accordance with the requirements of the ICO, a Closure Report for the VPCDA was submitted to IEPA on August 22, 1996. The Closure Report contains a detailed description of all closure-related activities, including characterization data, manifests, and other information relevant to the closure.

3.2.3 Administrative Controls

Contact with study area materials has been reduced by fencing and administrative control at the DePue Site. In 1994 the DePue Group restricted uncontrolled access to the FPSA by installing a continuous 6-foot high chain-link fence along the site perimeter and installing locks on the gates controlling access to the FPSA. The DePue Group also

increased security at the FPSA by instituting site-access procedures for visitors, and conducting periodic security patrols. The DePue Group has also partially fenced the South Ditch in the Southeast Area, thereby minimizing access and potential exposure of trespassers to portions of the South Ditch.

3.2.4 Fugitive Dust Inspection and Control

Routine inspections for fugitive dust were initiated in 1995. Since then, dust control measures have been implemented, when necessary, in accordance with a plan approved by the IEPA. The establishment of vegetation on most of the FPSA land surface has essentially eliminated the need for active dust control, and the air migration pathway for constituents from the FPSA has been eliminated as an active pathway. Vegetation covers approximately 90 percent of the FPSA, as shown on Figure 3-1.

3.2.5 Perimeter Air Monitoring

Perimeter air monitoring for particulates was conducted for a total of 17 months. Monitoring was conducted for 24-hour periods, twice per week, at six locations along the FPSA perimeter from September 30, 1994 through December 1, 1995 and from June 7, 1996 through August 30, 1996. During the program, more than 900 samples were collected and analyzed for metals and total suspended particulates. The study results indicated no significant risk related to suspended particulates from the FPSA, and air quality at the DePue Site boundary was consistent with background conditions for Illinois.

The DePue Group submitted an application to IEPA in July 1996 requesting the termination of the Perimeter Air Monitoring Program at the FPSA. Air monitoring data collected through July 1996 showed that detected constituent concentrations were below background concentrations and there was no technical justification for continued monitoring. IEPA approved the application for termination of the Perimeter Air Monitoring Program, effective September 3, 1996.

3.2.6 Interim Water Treatment Plant

The IWTP was constructed in the refurbished Horsehead power plant/maintenance building and began full operation on June 11, 1997. The IWTP has a capacity for metals treatment of up to 100 gallons per minute (gpm) of surface water and groundwater from the FPSA. Intercepted groundwater and surface water flow from the North Ditch, slag pile toe ditches, IRM walls and shallow interceptor trenches to the Lift Station south of Marquette Street where water is pumped to the IWTP for treatment (Figure 2-3). Initially, the treated effluent was discharged to the South Ditch. Since June 1, 2000, the treated effluent has been discharged to a former river water intake pipe, termed the River Water Line, which has been

converted to carry storm water to the Illinois River. The treated water now discharges to the Illinois River. The IWTP was subsequently upgraded with the addition of a triple filtration system that became fully operational on June 10, 2000.

3.2.7 Run-On Diversion

To reduce the volume of water flowing onto the study area or contacting impacted surface areas, The DePue Group has implemented a number of surface water management projects to minimize the potential for contact of clean storm water runoff and snow melt with contaminated materials on the study area (Figure 3-2). The storm water diversion work, conducted pursuant to the requirements of Task 3, Attachment 1, of the ICO, has included:

- F-2 Spring plugging in the North Ditch (11 gpm),
- Upper Bluff storm water diversion (19 acres),
- Lower Bluff storm water diversion (18 acres),
- Slag Pile storm water diversion (5.5 acres), and
- Marquette Street storm water diversion (1 acre).

The diverted surface water from the Slag Pile and Marquette Street flows to the South Ditch (Figure 2-3). The diverted surface water from the Upper Bluff and Lower Bluff is piped via the bluff drain into the River Water Line, which also conveys treated water from the IWTP, surface water from a farm field west of the Phosphogypsum Stack Area, and surface water from the capped and vegetated southwest quadrant of the Phosphogypsum Stack Area (Figure 3-2) to the Illinois River approximately 1 mile southeast of the study area.

3.2.8 South Ditch Corridor Study, South Ditch FRI/FFS, and South Ditch Interim Remedial Action

Investigation of the South Ditch and surrounding area was initiated in 1995 with the South Ditch Corridor Hydrogeologic Study. The Focused Remedial Investigation (FRI) of the South Ditch was undertaken in 1996, and the final FRI report was submitted to IEPA in July 1997. The DePue Group prepared a draft Focused Feasibility Study (FFS) for the South Ditch and submitted for IEPA review in April 1997. The FFS concluded that a cap-in-place alternative should be implemented. IEPA did not concur with the conclusions of the draft FFS, which, as a result, was not finalized. In May 1998, the DePue Group offered a presumptive remedy, subject to certain approvals and conditions proposed by the DePue Group, including the removal of unnatural sediment from the South Ditch. The DePue

Group submitted the Scoping Document for Presumptive Remedy to IEPA on February 22, 2001. In 2003, the IEPA issued an ROD for the sediment in the South Ditch. The preferred alternative was implemented by CBS, on behalf of the DePue Group, in 2004 and completed in 2005.

4.0 DATA GAP IDENTIFICATION

The Revised Phase I RI Report (ENVIRON, 2006) contained a summary and interpretation of the data collected as part of the Phase I RI and relevant supplemental studies. These data were used to characterize the nature and extent of soil and groundwater quality impacts in the study area, and to identify human health constituents of potential concern (HCOPCs). The ecological constituents of potential concern (ECOPCs) will be identified and evaluated during the Screening Level ERA. As stated in Section 1.3, a separate companion work plan will be prepared for performing the screening level ERA.

A list of HCOPCs was identified in the Revised Phase I RI Report (ENVIRON, 2006) based on a series of screening criteria. Based upon comments from the IEPA, the screening criteria were revised. Based on the revised screening criteria, a new list of HCOPCs was developed for the groundwater monitoring. The groundwater HCOPCs are listed in Table 4-1. The extents of selected HCOPCs detected above appropriate Conservative Risk-Based Screening Criteria (CRBSC) in the UWBZ, Top of the Lower Aquifer (TOLA), and Base of the Lower Aquifer (BOLA) are shown on Figures 4-1 through 4-3, respectively. These extents are based on the data summarized in the Section 6 tables of the Revised Phase I RI Report (ENVIRON, 2006). A detailed presentation of the data is contained in the Cumulative Phase I RI Data Report (Golder, 2002a).

Based on the distribution of HCOPCs detected above appropriate CRBSC, data gaps related to the RI objective of site characterization were identified in the conclusions section of the Revised Phase I RI Report.

The data usability evaluation for the Phase I RI and supplemental data presented in the Phase I RI has been completed. The objective of the evaluation was to determine the extent to which the supplemental data sets are suitable for site characterization, risk assessment, and remedy selection purposes. The Phase I RI data, Supplemental Studies data, and other study area data were evaluated to determine its completeness and overall usability in the baseline HHRA and ERA. A memorandum outlining the results of the data evaluation was submitted under separate cover to the IEPA on March 29, 2007. (ENVIRON, 2007a) As discussed in greater detail in the March 29, 2007 letter, for the majority of the data, the consultants who collected the data stated in their reports that the data were validated. ENVIRON's review did not find any reason to question the previous representations regarding the quality of data. Based on the review, ENVIRON concluded that the data are suitable for site characterization, risk assessment, and remedy selection.

The objective of this Phase II RI is to collect information sufficient to eliminate data gaps and to complete the database required for performance of a Feasibility Study (FS), ERA, and HHRA. The Phase II RI will focus on further defining the nature and extent and fate and transport of site-related contaminants.

Data collection areas for the study area that are being addressed as separate investigations and work plans include surface water runoff from the FPSA and UPSEA. Evaluations and response actions for surface water in the study area have been completed. Waste stream treatability has not been evaluated as part of the RI, and will be addressed as appropriate in a Design Study or FS. Consequently, these areas of investigation are not considered to be data gaps for the Phase II RI.

Investigations proposed to eliminate site characterization data gaps in the Revised Phase I RI Report are summarized below.

Hydrogeological Investigation Activities

- Performance of additional site investigation and data evaluation to assess the thickness, nature, and effectiveness of the Aquitard beneath the saturated fill materials at the northern perimeter of and within the Slag Pile Area, the southwest corner of the Lithopone Ridges Area, and the central portion of the Eastern Area.

- Further evaluation of the extent of the UWBZ.

- Evaluation of the hydraulic conductivity of lithopone waste, general fill materials, and the Aquitard by further sampling and permeability testing of solid materials in the Slag Pile Area, the Lithopone Ridges Area, and the Eastern Area.

Groundwater Investigation Activities

- Performance of additional groundwater quality investigations to complete the vertical and lateral definition of impacts south and southeast of the eastern portion of the FPSA.

- Performance of additional groundwater investigations to evaluate water quality in the TOLA. The groundwater investigation in the TOLA may extend beyond the study area in order to delineate HCOPCs detected above CRBSC at the study area boundaries.

- Performance of additional groundwater investigations to confirm that the conditions in the study area have not impacted the Bluff Area and to evaluate the hydraulic interaction between Bluff Area and FPSA groundwater such that Bluff Area groundwater quality data can be used as background water quality data (if appropriate).

- Evaluation of the effects of the groundwater IRM walls and shallow interceptor

trenches south of the Slag Pile on groundwater flow, groundwater gradients, and groundwater quality.

- Identification of users of the shallow groundwater in the Village of DePue (if any) by contacting Bureau County Health Department and Village of DePue water utility.

Geotechnical Sampling Activities

- Further testing of the density of the waste materials at the study area to estimate waste tonnage.

Geochemical Sampling Activities

- Further evaluation of the extent to which slag materials are capable of releasing residual metals, acid, and other constituents by leaching, oxidation, and biological processes by Humidity Cell Testing (HCT), Net Acid Generating (NAG) testing, mineralogical testing, biological testing, and physical properties testing.

- Evaluation of the metal-sequestration capabilities and mechanisms of the native material at the study area, by mineralogical testing, physical properties testing, biological testing, and sequestration testing.

- Collection of additional Synthetic Precipitation Leaching Procedure (SPLP) and Toxicity Characteristic Leaching Procedure (TCLP) data from slag, lithopone, and general fill to further evaluate the soil to groundwater migration pathway.

Soil Sampling Activities

- Evaluation of the potential for historic utility trenches and sewers to act as preferential flow paths, the DePue Group will excavate test pits at the locations where sewers and other utilities are believed to have crossed the FPSA boundaries.

- Evaluation of historic discharge along the north side of the railroad track in the area between the toe of the Village Water Main berm and the toe of the Railroad berm west of the Division Street drain road crossing and the IWTP Lift Station, and evaluation of a historic discharge from the Lithopone plant in the now filled ditch located along the north side of the railroad tracks from the south plant entrance gate to the location of the tunnel stream.

- Collection of additional soil samples in two locations based on a grid-based sampling approach as discussed in ENVIRON's September 19, 2007 letter, which is included in Appendix A.

Risk Assessment Activities

- Evaluation of the completeness and overall usability of the Phase I RI data, Supplemental Studies data, and other site data for use in site characterization, risk assessment, and remedy selection activities.

- Performance of a baseline HHRA for the FPSA.

- Performance of an ERA for the FPSA.

5.0 PHASE II REMEDIAL INVESTIGATION FIELD PROGRAMS

This section describes the investigations proposed to address the identified data gaps. The investigations will focus, as appropriate, on soil, groundwater, sediment, and surface water sampling. The focus of the sampling is to provide the necessary data for definition of nature and extent of impact; groundwater flow and transport mechanisms; and subsequently remedy selection. The field investigations will consist of drilling soil borings; installing monitoring wells; and collecting and analyzing soil, waste, surface water, groundwater, and sediment samples. A number of the soil boring and/or monitoring well locations will serve as data collection points for addressing multiple data gaps. The proposed work is summarized in Tables 5-1 and 5-2 by location, planned activities, and data gaps being addressed at each location. The locations are shown on Figures 5-1 and 5-2.

All work will be performed in accordance with the existing QAPP, FSP, HASP, DMP, and appropriate addenda.

5.1 Hydrogeological Investigation

5.1.1 Aquitard Evaluation

Additional investigation and data evaluation will be performed to assess the thickness, nature, and effectiveness of the Aquitard, including the peat beneath the saturated fill materials in the Lithopone Ridges Area and the central and south portion of the Eastern Area. These data will be used during the FS to assess potential closure-in-place remedies.

A total of eight borings will be drilled at the locations shown on Figure 5-1 using the rotosonic drilling method to evaluate the presence and thickness of the Aquitard. The proposed boring names and locations are as follows:

- SB-9 and SB-10 near wells W17S/W17D,
- SB-30 near boring C4,
- SB-7 near boring H5,
- SB-29 east of boring B4,
- SB-32 south of boring A5,
- SB-4 north of boring 17, and
- SB-8 east of well HS1.

Each boring will be installed to a depth at least 10 feet below the base of the Aquitard, as evidenced by penetration of at least 10 continuous feet of material with lithologic characteristics consistent with Lower Aquifer lithology, or to a maximum of

40 feet below ground surface (bgs). This depth is below the typical base of the aquitard in these areas. Continuous soil cores will be collected during the soil boring installation for logging in the field. Upon completion, the soil borings will be properly abandoned unless converted to monitoring wells.

5.1.2 UWBZ Evaluation

Further evaluation of the extent of the UWBZ will be performed in the northwest and southwest portions of the Eastern Area. Refinement of the lateral extent of the UWBZ is needed to complete the delineation of the HCOPCs in the UWBZ groundwater. The four borings listed below will be drilled at the locations shown on Figure 5-1 using the rotosonic drilling method to evaluate the presence or absence and thickness of the UWBZ.

- SB-9 and SB-10 near wells W17S/W17D,
- SB-5 near MW-1, and
- SB-6 near MW-10.

The soil borings will be advanced at least to the base of the Aquitard. By advancing these soil borings to the base of the Aquitard, coarse-grained lenses in the Aquitard will be identified, if present, in addition to the presence/absence of the UWBZ unit. One of the two borings near the W17S/W17D wells (SB-9 or SB-10) will be converted to a new TOLA well. UWBZ wells will also be installed in separate boreholes if the UWBZ is present at the boring locations.

Continuous soil core will be collected during the soil boring installation for logging in the field. Upon completion, the soil borings will be properly abandoned unless converted to monitoring wells.

5.1.3 Hydraulic Conductivity Evaluation

The purpose of the hydraulic conductivity evaluation is to obtain vertical and lateral permeability data for fate and transport analysis in the FPSA and UPSEA.

The horizontal hydraulic conductivity of the lithopone waste, slag, and general fill across the FPSA and UPSEA will be evaluated by performing single-well hydraulic conductivity tests at selected locations. Recovery tests will be performed in accordance with the methods described in the FSP and addendum. If there is insufficient water depth, low yield, or another condition making a recovery test inappropriate, a slug test will be performed. The horizontal hydraulic conductivity testing will be performed at the seven locations listed below and shown on Figure 5-1:

- Lithopone Ridges Area: Existing monitoring wells PS-14, PS-15, and PS-16;
- Eastern Area: A replacement well for the damaged PS-5 (i.e., PS-5R), which will be placed within 5 feet of PS-5 and screened within the same depth interval; and
- UPSEA: Proposed monitoring wells MW-25U, MW-26U, and MW-29U (see Section 5.2.1).

Vertical hydraulic conductivity testing will be performed by collecting Shelby Tube samples and submitting them to a qualified laboratory for flexible thin-wall permeameter tests. The vertical hydraulic conductivity of the Aquitard will be evaluated at the 14 locations listed below and shown on Figure 5-1:

- Lithopone Ridges Area: SB-28, SB-29, SB-30, SB-31, and SB-32;
- Eastern Area: SB-6, SB-7, and SB-10;
- Western Area: SB-1, SB-3, and SB-4; and
- UPSEA: SB-23, SB-24, and SB-37.

As stated in the Revised Phase I RI Report, the Aquitard consists of clays, silts, and peat with interstitial sand lenses. The vertical hydraulic conductivity of a stratum is biased toward the least permeable layers within the stratum, so each Shelby Tube sample will be collected from the 2-foot interval of the Aquitard with the thinnest total thickness of sand lenses starting from the top of the peat layer (if present). Two soil borings will be advanced at each location to facilitate selection of the 2-foot interval of the Aquitard with the thinnest total thickness of sand lenses. A pilot boring will be advanced and logged to determine the desired sample interval, and then a second boring will be advanced to obtain the Shelby Tube sample from that interval.

5.2 Groundwater Investigation

The groundwater investigation outlined in this section includes sampling of selected existing wells, newly installed wells, and selected seeps. To evaluate the condition of the existing monitoring wells located at the site, the DePue Group assessed all existing wells at the FPSA and the UPSEA on May 29 through May 31, 2007. Monitoring wells HH-03 through HH-06, located in the Bluff Area, were assessed on July 12, 2007. The monitoring well assessment was performed in accordance with the procedures outlined in the Addendum to the Field Sampling Plan, dated October 2006 (the "FSP Addendum"). A letter summarizing the monitoring well assessment and re-development results was submitted to IEPA on July 19, 2007. (ENVIRON, 2007b)

Based on the assessment results, a total of 29 monitoring wells required re-development, three monitoring wells that were not initially proposed for sampling during the Phase II RI require abandonment because they have been damaged beyond repair or do not contain enough water to sample (i.e., HS10(S), PS-06, and PS-02S), and five monitoring wells that were initially proposed for sampling during the Phase II RI require abandonment and replacement (i.e., HH-08, PZ-1S, PZ-1I, PS-05, W12S). At each replacement well location, the screened interval for the replacement wells will be installed at the same depth intervals as the original wells. However, the replacement wells for PZ-1S and PZ-1I will be constructed using 2-inch diameter well materials rather than 1-inch diameter well materials. The new well IDs for the replacement wells will end in "R" (e.g., PZ-1R). In addition, several wells require routine maintenance such as painting and repair of broken locking tabs.

Following completion of the well evaluation and subsequent well repair, the DePue group collected a complete round of groundwater samples in August 2007. Groundwater samples were obtained from all accessible and useable wells located at the site and were analyzed for the HCOPCs presented in Table 4-1. In addition, selected wells were sampled for certain polynuclear aromatics (PNAs) and/or heptachlor epoxide. The basis for the selection of certain wells for additional analysis is described in detail in ENVIRON's July 20, 2007 letter, which is included in Appendix A. After the results of the initial round of sampling were received, the DePue Group evaluated the proposed locations of new monitoring wells and the proposed sampling of existing monitoring wells outlined below and presented the final proposed locations to the IEPA for approval. No changes to the locations of the proposed monitoring wells were recommended based on the initial round of groundwater monitoring. The initial round of sampling for the existing wells and the initial sampling of the proposed wells outlined below will together constitute the first quarterly sampling event.

. All new and replacement wells will be installed using rotosonic drilling techniques or an alternate suitable drilling method. In several locations, the monitoring well locations will be used for multiple purposes. The proposed monitoring locations outlined below will be sampled quarterly for 1 year to evaluate seasonal variations.

5.2.1 UWBZ Groundwater Investigation

Additional groundwater quality sampling and data evaluation will be conducted to complete the delineation of impacts in the UWBZ to the south and southeast of the eastern portion of the FPSA and in the UPSEA. A total of eleven new wells will be installed in the UWBZ for the purpose of collecting water level data and groundwater samples. The proposed UWBZ well locations are shown on Figure 5-2 and described below.

- MW-23U and MW-24U will be installed near wells W17S/W17D, if the UWBZ is present at these locations (see Section 5.1.2);
- MW-25U will be installed in the northeast corner of the UPSEA;
- MW-26U will be installed in the southeast corner of the UPSEA;
- MW-29U will be installed in the UPSEA south of the Former Settling Ponds;
- MW-35U will be installed in the Slag Pile Area south of the eastern side of the Slag Pile and will be used as part of the evaluation of the IRM walls and interceptor trenches (see Section 5.2.5);
- MW-37U will be installed in the northwestern portion of the UPSEA. The specific location of MW-37U will be identified in the field by consensus of the IEPA and DePue Group representatives;
- MW-39U will be installed in the UPSEA south of the railroad tracks and between the IRM Wall and the Former Settling Ponds;
- MW-40U will be installed in the VPDCA;
- MW-41U will be installed in the Lithopone Ridges Area near soil boring B4; and
- MW-43U will be installed northwest of the CAMU for monitoring the CAMU. A groundwater monitoring plan for the CAMU will be proposed under separate cover.

In addition to the sampling of the proposed new UWBZ wells, groundwater samples will be collected from the following existing UWBZ wells and seeps: PZ1SR, PZ2S, PZ3S, PZ4S, W17S, W18S, W19S, HS11, HS12, N003 (Landfill Spring), N004 (South Spring), N005 (Southeast Spring), and N006. Following the review of the data from the first round of groundwater monitoring, this list of monitoring wells may be revised for the subsequent three rounds of quarterly groundwater monitoring. The following UWBZ wells will be sampled as part of the evaluation of the IRM walls and interception trenches (see Section 5.2.5): HS3, HS5, HS6, HS8, HS9, and PS-17.

The UWBZ groundwater samples will be analyzed for the HCOPCs listed in Table 4-1.

5.2.2 TOLA Groundwater Investigation

A total of eleven new wells will be installed in the TOLA to complete the delineation of impacts in the TOLA along the southern boundary of the FPSA and UPSEA. The proposed TOLA well locations are shown on Figure 5-2.

Monitoring well MW-22T will be installed near the former J-3 temporary well location. During the Phase I RI, sulfate was detected in five TOLA wells (G-3, G-4, I-5, J-3,

and W15S), at concentrations above the CRBSC. The sulfate concentration detected in the J-3 sample suggests that the sulfate plume may extend beyond the southern FPSA boundary. However, the J-3 sample was collected from a temporary well, which typically produces a relatively turbid sample. Furthermore, the concentration of sulfate in this sample was significantly higher than the sulfate concentrations detected in the neighboring upgradient and side gradient wells. Given these issues with the J-3 sample, the DePue Group proposes to install a permanent well near the J-3 location and sample the new well for the HCOPCs, including sulfate. If the new well in this location contains sulfate, or any other HCOPCs, at concentrations greater than the CRBSC, then off-site wells will be proposed to evaluate and define potential off-site groundwater quality impacts (see Section 5.2.6).

In addition to MW-22T, wells will be screened within the TOLA at the locations shown on Figure 5-2 and described below.

- MW-23T will be installed near W17S/W17D;
- MW-25T will be installed at the northeast corner of the UPSEA;
- MW-26T will be installed in the southeast corner of the UPSEA;
- MW-27T will be installed adjacent to wells W18S and W18D in the UPSEA;
- MW-28T will be installed adjacent to UWBZ well HS11 in the UPSEA;
- MW-29T will be installed in the UPSEA south of the Former Settling Ponds;
- MW-30T will be installed in the Lithopone Ridges Area near boring C4;
- MW-35T will be installed in the Slag Pile Area south of the eastern side of the Slag Pile;
- MW-36T will be installed in the UPSEA south of the eastern side of the Slag Pile; and
- MW-40T will be installed adjacent to VPCDA well W22S.

Monitoring wells MW-23T, MW-25T, MW-26T, MW-29T, and MW-35T will be nested with the UWBZ wells proposed for those locations. In addition to the sampling of the proposed new TOLA wells, groundwater samples will be collected from the following existing TOLA wells: PZ1I(R), PZ2I, PZ3I, PZ4I, HH-08(R), HH-09, HS13, W5S, and PS-11. Following the review of the data from the first round of groundwater monitoring, this list of monitoring wells may be revised for the subsequent three rounds of quarterly groundwater monitoring. As discussed above monitoring well HH-08 and PZ-1I were previously abandoned will be replaced with a similarly constructed TOLA placed as close to the original location as possible. The TOLA groundwater samples will be analyzed for the HCOPCs listed in Table 4-1. All the TOLA groundwater sampling locations are shown on Figure 5-2.

5.2.3 BOLA Groundwater Investigation

A total of ten new wells will be installed in the BOLA to complete the delineation of the impacts in the BOLA along the southern boundary of the FPSA and UPSEA. The proposed BOLA well locations are shown on Figure 5-2 and described below.

- MW-25B will be installed at the northeast corner of the UPSEA,
- MW-26B will be installed in the southeast corner of the UPSEA,
- MW-29B will be installed in the UPSEA south of the Former Settling Ponds,
- MW-21B will be installed in the Slag Pile Area south of the Slag Pile,
- MW-20B and MW-22B will be installed along the southern boundary of the southwestern portion of the FPSA;
- MW-38B will be installed between the Lithopone Ridges Area and the Slag Pile to provide a sample downgradient of the ridges and upgradient of the Slag Pile;
- MW-40B will be installed adjacent to VPCDA well W22S;
- MW-41B will be installed adjacent to soil boring B4 in the Lithopone Ridges Area, and
- MW-42B will be installed south of PZ-4S/PZ-4I in the Slag Pile Area.

BOLA wells MW-25B, MW-26B, MW-29B, MW-22B, MW-40B, and MW-41B will be nested with the UWBZ and/or TOLA wells that are proposed for these locations. These nested wells will assist in the evaluation of the potential interaction between the three zones and the mechanisms of BOLA impacts. In addition to the sampling from the proposed BOLA wells, additional groundwater quality samples will be collected from existing BOLA wells: W17D, W18D, and W19D. Following the review of the data from the first round of groundwater monitoring, this list of monitoring wells may be revised for the subsequent three rounds of quarterly groundwater monitoring. All of the BOLA groundwater samples will be analyzed for the HCOPCs listed in Table 4-1.

5.2.4 Bluff Area Groundwater Investigation

Additional groundwater investigation and data evaluation will be conducted to confirm that conditions in the study area have not impacted the Bluff Area and to evaluate the nature and extent of potential impacts, groundwater flow, and the hydraulic interaction between the Bluff Area and the FPSA groundwater (i.e., transport mechanisms). Some or all of the resulting data may be proposed as background water quality data for the FPSA.

Groundwater samples will be collected from the following existing Bluff Area wells: W1S, W12S(R), W12D, W2S, W2D, W3S, and W4S. Following the review of the data

from the first round of groundwater monitoring, this list of monitoring wells may be revised for the subsequent three rounds of quarterly groundwater monitoring. Four additional monitoring wells will be installed upgradient of the FPSA to further define groundwater quality in the TOLA upgradient of the FPSA; consequently, all four of the new Bluff Area wells will be screened in the TOLA. The proposed Bluff Area wells are shown on Figure 5-2 and listed below:

- MW-31T will be installed adjacent to existing wells W12S and W12D,
- MW-32T will be installed adjacent to existing wells W2S and W2D,
- MW-33T will be installed adjacent to existing well W3S, and
- MW-34T will be installed adjacent to existing well W4S.

The groundwater samples to be collected from the proposed and existing Bluff Area wells will be analyzed for the HCOPCs listed in Table 4-1.

The uppermost groundwater system in the Bluff Area has been designated as Bluff Undifferentiated. This system lies adjacent to the UWBZ system; however, the interaction between the Bluff Undifferentiated groundwater system and the UWBZ is not completely understood. The groundwater flow pathways from the Bluff Area to the UWBZ will be evaluated during the Phase II RI to determine if one or more of the Bluff Area wells can be considered hydraulically upgradient of the UWBZ and suitable for use as UWBZ background wells. This evaluation will be conducted using the soil boring logs, water level data, and groundwater sampling results for the existing and new Bluff Area wells.

If existing Bluff Area wells cannot be used as upgradient-background wells for the UWBZ on the FPSA, then up to two additional UWBZ wells may be installed along the northern perimeter of the FPSA. Locations for these additional UWBZ wells, if appropriate, will be determined during the Phase II RI in consultation with IEPA.

5.2.5 Evaluation of Groundwater Collection System/IRM Walls

An investigation will be performed to evaluate the effects of the groundwater IRM wall/shallow interceptor trench systems on groundwater geochemistry, groundwater flow, and groundwater capture downgradient of the slag pile. The investigation will consist of collecting groundwater quality samples and water levels upgradient and downgradient of each of the system components while the passive system is operating and after the drains for the system have been temporarily sealed.

As-built dimensions of the IRM walls and shallow interceptor trenches are not available; therefore, the locations and dimensions will be determined in the field using a backhoe/excavator to dig test pits. The potential test pit locations are shown on Figure 5-2.

The test pits will start at locations likely to be within the lateral extent of the IRM walls and proceed outward from those locations until the ends of the IRM walls are located. For the north IRM wall, the test pit excavation will be continued deeper near or at the end of each wall to determine the approximate total depth of thee IRM walls. For the middle and south IRM walls, the excavation will be limited to locating the ends of the walls. These walls are fairly straight according to the plans, and the DePue Group would like to minimize the disturbance of surface features above these walls (i.e., the sidewalk above the central IRM wall and the shallow groundwater collection system liner above the south IRM wall). The DePue Group will consult with the IEPA during the test pit activities if the initial test pit data suggests re-locating subsequent test pits. During test pit activities, care will be taken to avoid damaging the systems during the construction confirmation work. If practicable, the physical condition of the IRM walls will be examined and noted. The locations and dimensions of the systems will be surveyed by a licensed surveyor and as-built diagrams of the systems will be prepared to the extent allowed by the construction confirmation achieved in the field.

The evaluation of the effects of the IRM wall/shallow interceptor trench systems on the downgradient groundwater geochemistry, flow, and capture will be completed using existing permanent UWBZ wells and proposed temporary UWBZ wells. Installation methods and construction details for the temporary wells will be specified in the FSP addendum. The wells will be configured in three north-south oriented lines, perpendicular to the east-west oriented IRM walls and shallow interceptor trenches, as shown on Figure 5-2.

The downgradient well for each of the transects will be south of the railroad right-of-way. The northernmost well in each transect will be north of the north IRM wall near the toe of the slag pile. Actual locations of the proposed temporary wells will be determined based on: (1) installation constraints posed by the existing utilities and remediation system, and (2) the as-built locations of the IRM walls and shallow interceptor trenches.

For the western well transect, temporary well TW-1U will be installed to monitor the groundwater north (upgradient) of the North IRM Wall. The existing HS3 (Slag Area) well will be used to monitor the groundwater between the North IRM Wall and the Center IRM Wall/north shallow interceptor trench systems. Temporary well TW-2U will be installed between the line of the Center IRM Wall/north shallow interceptor trench systems and the South IRM wall/shallow interceptor trench systems. Temporary well TW-3U will be installed between the South IRM wall/shallow interceptor trench systems and the railroad right-of-way, and temporary well TW-4U will be installed south of the railroad line.

For the central well transect, the existing HS5 (Slag Area) well will be used to monitor the groundwater north (upgradient) of the North IRM Wall. Existing well HS6

(Slag Area) and existing well PS-17 (Slag Area) will be used to monitor the groundwater between the North IRM Wall and the Center IRM Wall/north shallow interceptor trench systems. Existing well HS8 (UPSEA) will be used to monitor the groundwater between the Center IRM Wall/north shallow interceptor trench systems and the South IRM Wall/shallow interceptor trench systems. Existing well HS9 (UPSEA) will be used to monitor the groundwater between the South IRM Wall/shallow interceptor trench systems and the railroad right-of-way, and proposed well MW-39U will be installed south of the railroad line. Installation of well MW-39U will provide a complete transect of monitoring wells within and downgradient of the area of the highest concentrations in groundwater beginning at the south-center of the slag pile.

For the eastern well transect, the proposed well MW-35U will be installed to monitor the groundwater north (upgradient) of the North IRM Wall. Temporary well TW-5U will be installed to monitor the groundwater between the North IRM Wall and the Center IRM Wall/north shallow interceptor trench systems. Temporary well TW-6U will be installed between the line of the Center IRM Wall/north shallow interceptor trench systems and the South IRM wall/shallow interceptor trench systems. Temporary well TW-7U will be installed between the South IRM wall/shallow interceptor trench systems and the railroad right-of-way, and temporary well TW-8U will be installed south of the railroad line.

The top of casing elevation for each new well will be surveyed, and the depth-to-water will be measured at the wells listed above as well as wells MW-37U, W18S, PZ3S, PZ4S, and HS11(S) while the passive system is operating and at least daily for 3 weeks after the drains have been temporarily sealed. Table 5-3 summarizes the monitoring wells proposed to evaluate the groundwater collection system/IRM walls. The UWBZ groundwater elevation, at each temporary and existing well, will be calculated using the depth-to-water measurements and the survey data for the proposed temporary wells and the existing survey data for the existing wells. The resulting UWBZ groundwater elevations will be used to determine the groundwater flow direction, and rate and volume of groundwater flow through this area will be calculated using the geologic logs and the previously collected hydraulic conductivity values.

Each of the proposed temporary wells and existing wells in the three transects (Table 5-3) will be sampled while the passive system is operating and again 3 weeks after the drains have been temporarily sealed. These samples will be analyzed for the HCOPCs listed in Table 4-1. The groundwater samples collected from each of these wells will be analyzed in the field for pH, oxidation-reduction potential (ORP), dissolved oxygen (DO), conductivity, turbidity, and temperature.

If the groundwater rises to within 6 inches of the ground surface prior to the end of the 3-week shutdown period for the passive interception drains, then the groundwater

samples will be immediately collected and the drains will be opened.

These temporary wells will be removed and their boreholes will be sealed with bentonite prior to the completion of the Phase II RI sampling activities.

5.2.6 Off-Site Groundwater Investigation

Additional groundwater investigation and data evaluation will be conducted to confirm that groundwater impacts have not migrated from the FPSA to the residential area and DePue Lake, which are both located south (downgradient) of the FPSA. This off-site groundwater investigation will also evaluate the FPSA's hydrogeologic relationships with the downgradient residential area and DePue Lake. A phased approached is proposed for the installation and sampling of the off-site wells.

The first phase will consist of sampling the FPSA UWBZ, TOLA, and BOLA wells along the southern boundary of the study area (see Sections 5.2.2 and 5.2.3). The study area wills will be sampled quarterly (see Section 5.2) and the results will be evaluated at the conclusion of each quarterly sampling event to determine if impacts above the CRBSC are encountered in wells adjacent to the property line. To facilitate completion of the Phase II RI using an iterative process, the quarterly groundwater sampling results will be summarized in a technical memorandum and submitted to the IEPA within 90 days of the sampling date. The data from the perimeter wells (i.e., W5S, PS-11, MW-22T, MW-22B, MW-23U, MW-23T, W17S, W17D, MW-24U, PZ4S, PZ4I, W18S, W18D, MW-27T, MW-29U, MW-29T, MW-29B, HS11(S), MW-28T, W19S, W19D, MW-36T, MW-26U, MW-26T, and MW-26B) will be used to determine if additional monitoring wells are needed to evaluate the off-site groundwater. Following IEPA review of the technical memorandum, the DePue Group and IEPA will concur on the necessity to proceed to a second phase.

The second phase will consist of preparing and submitting a work plan addendum for an off-site groundwater investigation. The wells installed as part of the off-site program will be sampled only for those HCOPCs detected above the CRBSC in FPSA wells at the site boundary. Off-site wells will be sampled quarterly for 1 year to evaluate seasonal variability.

Prior to installing off-site monitor wells, one or more pilot soil borings may be drilled at appropriate off-site locations to characterize hydrogeologic conditions. Each pilot soil boring will be drilled to bedrock or 100 feet bgs, whichever is encountered first. A continuous soil core will be collected during the installation of each soil boring for logging in the field. The hydrogeologic data collected from the pilot soil borings will be used to refine the off-site groundwater investigation scope of work, as appropriate.

Groundwater investigations and data evaluation will be conducted at selected locations to confirm that areas of significant slag fill identified as part of OU4 RI activities

have not impacted groundwater quality. Based on the results of the groundwater sampling and analysis at these locations, additional investigations of off-site slag fill areas may be considered.

5.2.7 Well Survey

A well survey will be conducted to identify any users of the shallow groundwater in the Village of DePue. The well survey will be conducted utilizing the records of the Bureau County Health Department, the Illinois Department of natural Resources (IDNR), the Illinois State Water Survey (ISWS), the Illinois State Geological Survey (ISGS), and the Village of DePue. The well survey will be conducted in accordance with procedures identified in the 2003 IEPA *Fact Sheet – Performing Well Surveys.*

In addition to the well survey, the Village of DePue will be contacted to obtain information about any pending or proposed ordinances related to groundwater usage in the village.

5.3 Geotechnical Investigation

5.3.1 Non-Native Material Testing

Geotechnical testing of the non-native material at the FPSA and UPSEA will be performed and the resulting data will be used in the remedy evaluation as part of the FS. Soil samples will be collected for analysis of density, compaction, grain size, and moisture content. The soil samples will be collected from borings advanced using rotosonic drilling techniques.

The proposed locations of the geotechnical sample collection are shown on Figure 5-1 and described below:

- Lithopone Ridges Area: SB-28, SB-29, SB-30, SB-31, and SB-32 will be installed in the Lithopone Ridges Area, one lithopone waste sample (if present), and one slag or general fill sample will be collected from each of these borings.

- Slag Area: SB-12, SB-13, SB-14, SB-15, SB-16, and SB-17 will be installed in the Slag Pile Area and two slag samples will be collected from each boring. Each of the slag pile borings will extend almost to the top of the peat unit, but will not penetrate the peat unit. From each boring, one slag sample will be collected from the upper half of the boring and the other slag sample will be collected from the lower half of the boring. The sample depths will vary so that the samples are collected from various depths within the slag pile.

- Eastern Area and UPSEA: SB-6, SB-7, SB-9, SB-10, SB-25, SB-26, and SB-27 will be installed in the general fill in the Eastern Area and UPSEA. Soil borings SB-25 and SB-26 will be installed in the Former Municipal Dump. One to two samples, depending on the thickness of the non-native material, will be collected from each of these boring for geotechnical testing.

The boreholes will be sealed from bottom to top with bentonite slurry immediately after completion unless a monitoring well is installed in the borehole.

5.3.2 Aquitard Testing

Geotechnical testing of the Aquitard at the FPSA and UPSEA will be conducted and the resulting data will be used in the remedy evaluation as part of the FS. Soil samples will be collected from the Aquitard for analysis of Atterberg Limits, consolidation, porosity, and moisture content. The samples will be taken from the Shelby Tubes collected for the vertical hydraulic conductivity testing described in Section 5.1.3. Therefore, the Aquitard geotechnical sample locations are the same as the vertical hydraulic conductivity sample locations. These sample locations are shown on Figure 5-1.

5.4 Geochemical Investigation

5.4.1 Geochemistry of Non-Native Material

The extent to which non-native material (slag, lithopone waste, and general fill) are capable of releasing residual metals, acid, and other constituents through leaching, oxidation, and biological processes will be evaluated. The tests listed below will provide data on the potential future liberation of metals by sulfide weathering. Up to six soil borings (SB-12, SB-14, SB-17, SB-25, SB-27, and SB-30) will be drilled at the locations shown on Figure 5-1 using rotosonic drilling, and up to six slag samples, up to six general fill samples, and one lithopone waste sample will be collected. Tests that may be performed on the samples of non-native material are described below. A QAPP addendum will be prepared describing the testing methods to be used and the decision process for selecting which tests will be performed on each sample. Certain tests will be performed in a sequential manner with the results of the previous test determining if the subsequent test will be performed.

Humidity Cell Testing (HCT)

Net Acid Generating (NAG) Testing

Identification of Sulfate Reducing Bacteria

Mineralogical Testing:

- Total analysis by aqua regia digestion
- Mineralogical analysis by XRD
- Gravimetric concentration and XRD of concentrate
- Sulfur speciation (sulfate, sulfide, elemental sulfur, other sulfur) by Leco furnace or equivalent
- Elemental identification by electron microprobe analysis
- Acid volatile sulfide (AVS)
- Acid leachable metals

Sequestration Testing:

- Paste pH test
- Total organic carbon
- Cation exchange capacity test using Barium Chloride extraction test
- Sequential batch testing of removal of metals from soil sample under anaerobic conditions (Langmuir test)
- Long-term column test of removal of metals under anaerobic conditions

5.4.2 Geochemistry of Native Material

The metal-sequestration capacity of the native material at the FPSA and UPSEA will be evaluated. The tests listed below will provide data on the capacity of the native material to bind metals. In addition, the tests will provide data on whether and to what extent metals can be remobilized from the native material. Soil samples will be collected from six borings advanced using rotosonic drilling (SB-8, SB-11, SB-18, SB-19, SB-20, and SB-31) at the locations shown on Figure 5-1. Samples will be collected from peat, clay, silt (Aquitard), and sand (Aquifer), if encountered, from each boring. Up to 24 samples will be collected. Below is a list of potential tests that may be performed on the samples of native material. The methods to be used and the decision process for selecting which tests will be performed on each sample will be included in the QAPP addendum. Certain tests will be performed in a sequential manner with the results of the previous test determining if the subsequent test will be performed.

Identification of Sulfate Reducing Bacteria

Mineralogical Testing:

- Total analysis by aqua regia digestion
- Mineralogical analysis by XRD
- Gravimetric concentration and X-ray diffraction of concentrate
- Sulfur speciation (sulfate, sulfide, elemental sulfur, other sulfur) by Leco furnace or equivalent
- Elemental identification by electron microprobe analysis
- AVS
- Acid leachable metals

Sequestration Testing:

- Paste pH test
- Total organic carbon
- Cation exchange capacity test using Barium Chloride extraction test
- Leachability (desorption) using the SPLP test
- Sequential batch testing of removal of metals from soil sample under anaerobic conditions (Langmuir test)
- Long-term column test of removal of metals under anaerobic conditions

5.4.3 SPLP/TCLP Samples

SPLP and TCLP samples will be collected from slag, lithopone, and general fill to further evaluate the soil-to-groundwater migration pathway and to evaluate remedy options as part of the FS (e.g., classifying the material). The samples will be analyzed for the metal HCOPCs listed in Table 4-1. These data will also be used to refine HCOPC screening values for inorganic constituents that do not have pH-specific criteria for the soil- to-groundwater migration pathway (e.g., manganese).

Soil samples will be collected from 17 soil borings (i.e., SB-6, SB-7, SB-9, SB-10, SB-12, SB-13, SB-14, SB-15, SB-16, SB-17, SB-25, SB-26, SB-28, SB-29, SB-30, SB-31, and SB-32). Up to 17 slag samples, up to 8 general fill, and up to 10 lithopone waste samples will be collected and analyzed using SPLP and TCLP analyses. The proposed locations for the SPLP and TCLP samples are shown on Figure 5-1.

An evaluation of the number of samples that are being collected from the lithopone and slag has been performed. This evaluation is included at Appendix B.

5.4.4 Ignitability, Corrosivity, and Reactivity Samples

Ignitability, corrosivity, and reactivity testing will be conducted on non-native material samples collected from the FPSA and UPSEA. The specific tests include closed

cup flashpoint, pH, paint filter, reactive cyanide, reactive sulfide, and total phenol. The number of samples, sample locations, and depths will correspond to the SPLP/TCLP sampling locations, as described in Section 5.4.3 above. The resulting data will be used in the remedy evaluation as part of the FS (e.g., classifying the material).

5.5 Surface Water and Sediment Sampling

The current conditions in the North Ditch will be evaluated by collecting five samples (ND-1 through ND-5) of surface water and, if present, channel sediment. The current conditions in the Former Settling Ponds will also be evaluated by collecting one surface water and one sediment sample from each of the two Former Settling Ponds (i.e., SP-1 and SP-2). In addition, surface water samples will be obtained from seeps N003, N004, N005, and N006. If other significant seeps are observed during the Phase II RI work, the seeps will be surveyed and the decision to sample the seeps will be made in consultation with the IEPA. If the seep elevation is measured to be below 450 feet above mean sea level, the seep will be addressed as part of the Lake RI, otherwise, the seep will be sampled as part of the Former Plant Site Area Phase II RI. All surface water samples will be analyzed for the HCOPCs listed in Table 4-1. In each area, one sediment sample will be selected for analysis of the Suite 1a constituents identified in the Golder Site Investigation Work Plan (Golder 1999a and Golder 1999b) based on field screening, and the remaining samples will be analyzed for the Suite 1 constituents identified in the Golder Site Investigation Work Plan (Golder 1999a and Golder 1999b). The surface water and sediment sampling locations are shown on Figure 5-1.

5.6 Soil Investigation

5.6.1 Evaluation of Utility Corridors

To evaluate the potential for historic utility trenches and sewers to act as preferential flow paths, the DePue Group will complete approximately 25 test pits at the locations shown on Figure 5-2. The test pits will be located parallel to the property line +/- 10-feet from the estimated location of the historic utility trenches. These locations were selected based on the DePue Group's review of historical drawings of the plant and utility abandonment records including the utility drawing provided by IEPA in December 2006 (i.e., 1904Toposhistoricoffsitedrains)v2(2).pdf). The purpose of these test pits is to determine if the utilities have been abandoned (if possible), determine the location and depth of the utilities, and determine the general alignment. Soil and/or groundwater sample may be collected from the trenches based on conditions observed in the field. The decision to collect groundwater and soil samples will be made in consultation with the IEPA on a pit by

pit basis. In each area where samples are collected, at least one soil samples will be analyzed for the Suite 1a constituents identified in the Golder Site Investigation Work Plan (Golder 1999a and Golder 1999b), and any additional soil samples will be analyzed for the Suite 1 constituents identified in the Golder Site Investigation Work Plan (Golder 1999a and Golder 1999b). Any water samples will be analyzed for the groundwater HCOPCs listed in Table 4-1. If both water and soil samples are collected from an area, the water sample will be filtered prior to analysis to avoid issues with suspended sediment resulting from the excavation effort. If only a water sample is collected, both filtered and unfiltered samples will be analyzed. This information will be considered during the FS process for its impact on potential remedies.

5.6.2 Evaluation of Historic Discharges

Two test pits will be completed to evaluate a historic discharge along the north side of the railroad track. These test pits will be completed along the north side of the railroad tracks in the area between the toe of the Water Main berm and the toe of the Railroad berm west of the Division Street drain road crossing and the IWTP Lift Station. Five test pits will be completed to evaluate a historic discharge from the former Lithopone plant. These test pits will be advanced in the now filled ditch located along the north side of the railroad tracks from the south plant entrance gate to the location of the tunnel stream. The general location of the test pits is shown on Figure 5-2.

All test pits will be advanced to a depth approximately 1 foot below the depth where native soil is observed. Soil and/or groundwater sample may be collected from the trenches based on conditions observed in the field. The decision to collect soil samples from the test pits will be made by field consensus of the IEPA and DePue Group representatives. One soil sample from each area will be analyzed for the Suite 1a constituents identified in the Golder Site Investigation Work Plan (Golder 1999a and Golder 1999b), and any remaining soil samples will be analyzed for the Suite 1 constituents identified in the Golder Site Investigation Work Plan (Golder 1999a and Golder 1999b). Any groundwater samples that are collected will be filtered prior to analysis to avoid issues with suspended sediment resulting from the excavation effort and analyzed for the groundwater HCOPCs, which are listed in Table 4-1.

5.6.3 Additional Soil Borings

As requested by IEPA, ENVIRON evaluated the soil sampling coverage of the FPSA using the same statistical approach that was used to develop the sediment sampling approach for DePue Lake, which was summarized in a January 6, 2006 letter prepared by Blasland,

Bouck & Lee, Inc. The sampling approach for DePue Lake was developed for the initial sampling. In the case of the FPSA, soil sampling has been performed, and the sampling approach developed was used to determine if additional samples need to be collected from the FPSA. The grid based method used to evaluate the soil sampling coverage is described in greater detail in ENVIRON's September 19, 2007 letter, which is included in Appendix A. Based on the evaluation, there are two additional locations (i.e., SB-4 and SB-9) where soil samples will be collected and analyzed.

At the proposed sample locations (i.e., SB-4 and SB-9), the methodology described in the existing site-wide FSP (Golder 1999b) will be used. Specifically, at each of the locations, the boring will be advanced to the water table. If native soil is not encountered before the water table, the boring will be advanced until native soil is encountered. It is anticipated that the total depth of the borings will be 10 to 20 feet bgs for the purposes of this sampling. Because these soil borings are being used for multiple purposes, they may be advanced deeper for other purposes as outlined in this Phase II RI Work Plan, Revision 1. Up to four intervals from each soil boring will be submitted to the analytical laboratory for analysis based on the following:

- A surface sample from the 0- to 0.5-foot bgs interval (below compost whenever present) will be submitted for analysis;

- The last fill soil interval above the water table will be submitted, unless the water table occurs at less than 3 ft bgs, in which case a second fill sample will not be submitted;

- The first interval of native soil below the fill is to be submitted;

- If native soil is encountered above the water table, the last native soil interval above the water table will be submitted.

As was done for the soil sampling during the Phase I RI, the soil boring will be sampled in 2.5-foot intervals. If both fill and native soil are encountered in the same interval, the interval will be divided at the interface between the fill and native soil.

The analysis selected for each boring will also be based on the FSP. At a minimum, all intervals sampled from the two soil boring locations identified above will be analyzed for the Suite 1 constituents identified in the Golder Site Investigation Work Plan (Golder 1999a and Golder 1999b). In addition, one interval from each of the two soil borings will be selected for analysis of the Suite 1a constituents identified in the Golder Site Investigation

Work Plan (Golder 1999a and Golder 1999b). This will ensure that at least 10% of the samples are analyzed for Suite 1a and that the analyses are distributed across the Site.

5.7 Risk Assessment

5.7.1 Human Health Risk Assessment

An HHRA will be performed for the FPSA and UPSEA. A separate companion work plan will be prepared for performing the HHRA.

5.7.2 Ecological Risk Assessment

An ERA will be performed for the FPSA and UPSEA. A separate companion work plan will be prepared for performing the ERA.

6.0 REPORTING

As discussed in Section 5.2.6, to facilitate completion of the Phase II RI using an iterative process, the quarterly groundwater sampling results will be summarized in a technical memorandum and submitted to the IEPA within 90 days of the sampling date. Following IEPA review of the technical memorandum, the DePue Group and IEPA will concur on the necessity for additional activities.

Following the collection of the Phase II RI data, a technical data summary report will be prepared. This report will summarize the field and laboratory investigations. The technical data report will also address the completeness of the overall Phase II RI data in terms of assessing potential risks to human health and the environment. The technical memorandum will either identify data gaps that remain and propose additional investigations, or conclude that the RI is complete. The technical data report will be submitted to the IEPA for review and concurrence.

Upon concurrence with IEPA that the data set contained in the technical data report and prior submittals is considered complete for addressing the objectives of the Phase II RI, a comprehensive Phase II RI Report will be prepared. This report will include a summary and interpretation of the Phase I and Phase II RI data, as well as the baseline ERA and the baseline HHRA. Work Plans for the completion of these two studies are provided separately.

7.0 REFERENCES

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TABLES

TABLE 3-1

Summary of Remedial Actions
DePue Site
DePue, Illinois

Date	Area	Remedial Action(s)
1981-1984	Lithopone Ridges	Consolidation, liming, capping and vegetation of the ridges. Berm repair.
1981-1984	Primary Zinc Slag Pile	Regrading, capping, and vegetation of the pile. Installation of stormwater piping.
1989-1991	North Ditch	Backfilling with iron-rich material.
1989-1991	South Ditch	Installation of in-situ passive groundwater iron-rich material treatment walls. Stormwater piping improvements.
1994	Primary Settling Ponds	Removal of bottom sediments.
1994 - 1996	Site Perimeter	Air monitoring for particulates showed no significant risk and levels consistent with Illinois background.
1995	Former Vanadium Pentoxide Catalyst Disposal Area	Area closure.
1995	Sidewalk/Road	Installation of shallow drains. Stormwater piping improvements.
1995	Site	Dust suppression. Vegetation of site. Installation of gravel. Dust inspections.
1995	Site	Site security. Installation of fence around Former Plant Site Area. Installation of partial fence around Southeast Area.
1995-1997	South Ditch	Performance of hydrogeologic study, focused remedial investigation, and focused feasibility study.
1996	Phosphogypsum Stack Area	Seepage control system installation. Gypstack closure.
1996-2000	Former Plant Site Area	Revegetation of the Former Plant Site Area.
1997	Interim Water Treatment Plant	Construction of treatment plant for groundwater and surfacewater from the Former Plant Site Area (up to 100 gallons per minute).

TABLE 4-1

List of HCOPCs
DePue Site
DePue, Illinois

Total Inorganics (mg/L)

Aluminum
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Manganese
Mercury
Nickel
Selenium
Silver
Thallium
Vanadium
Zinc

Miscellaneous

Ammonia as N
Fluoride
Nitrate+Nitrite as N
Nitrite as N
Phosphorus, Total
Sulfate

Radionuclides

Radium 228 Gamma

HCOPC = Human Health Constituent of Potential Concern

TABLE 5-1

Proposed Phase II RI Soil Boring, Monitoring Well, and Sediment Sampling Locations
DePue Site
DePue, Illinois

Investigation	Hydrogeological				Groundwater					Geotechnical		Geochemical				Sediment	Soil
Evaluation	Soil Boring Investigation		Hydraulic Conductivity Evaluation		Permanent Monitoring Wells				Temporary Monitoring Wells	Non-Native Material Testing	Aquitard Testing	Geochemistry Analysis of Non-Native Material	Geochemistry Analysis of Native Material	SPLP/TCLP Analysis	Ignitability, Corrosivity, and Reactivity Analysis	Sediment Samples	Soil Samples
	Aquitard Evaluation	UWBZ Evaluation	Recovery Test[1]	Aquitard Permeameter Test	UWBZ	TOLA	Bluff Undiferentiated	BOLA	Collection System and IRM Walls								
Section of Phase II RI Work Plan	5.1.1	5.1.2	5.1.3		5.2.1	5.2.2/5.2.4	5.2	5.2.3	5.2.5	5.3.1	5.3.2	5.4.1	5.4.2	5.4.3	5.4.4	5.5	5.6.3
Western Area																	
SB-1/MW-20B				X				X			X						
SB-3/MW-22T/B				X		X		X			X						
SB-4	X			X							X						X
Eastern Area																	
SB-5		X															
SB-6		X		X						X	X			X	X		
SB-7	X			X						X	X			X	X		
SB-8	X												X				
SB-9/MW-23U/T	X	X			X	X				X				X	X		X
SB-10/MW-24U	X	X		X	X					X	X			X	X		
SB-39/MW-38B								X									
SB-46/MW-43U					X												
PS-05R[2]			X														
Slag Pile Area																	
SB-11													X				
SB-12										X		X		X	X		
SB-13										X				X	X		
SB-14										X		X		X	X		
SB-15										X				X	X		
SB-16										X				X	X		
SB-17										X		X		X	X		
SB-18													X				
SB-2/MW-21B								X									
SB-40/MW-35U/T					X	X			X								
SB-38/MW-37U					X												
SB-45/MW-42B								X									
TW-1U									X								
TW-2U									X								
TW-5U									X								
TW-6U									X								
PZ-1SR[3]					X												
PZ-1IR[3]						X											
UPSEA																	
SB-19													X				
SB-20													X				
SB-21/MW-25U/T/B			X		X	X		X									
SB-22/MW-26U/T/B			X		X	X		X									
SB-23/MW-27T				X		X					X						
SB-24/MW-28T				X		X					X						
SB-25										X		X		X	X		
SB-26										X				X	X		
SB-27/MW-29U/T/B			X		X	X		X		X		X					
SB-37/MW-36T				X		X					X						
SB-41/MW-39U					X				X								
TW-3U									X								
TW-4U									X								
TW-7U									X								
TW-8U									X								

TABLE 5-1

Proposed Phase II RI Soil Boring, Monitoring Well, and Sediment Sampling Locations
DePue Site
DePue, Illinois

Investigation	Hydrogeological				Groundwater					Geotechnical		Geochemical				Sediment	Soil
Evaluation	Soil Boring Investigation		Hydraulic Conductivity Evaluation		Permanent Monitoring Wells				Temporary Monitoring Wells	Non-Native Material Testing	Aquitard Testing	Geochemistry Analysis of Non-Native Material	Geochemistry Analysis of Native Material	SPLP/TCLP Analysis	Ignitability, Corrosivity, and Reactivity Analysis	Sediment Samples	Soil Samples
	Aquitard Evaluation	UWBZ Evaluation	Recovery Test[1]	Aquitard Permeameter Test	UWBZ	TOLA	Bluff Undiferentiated	BOLA	Collection System and IRM Walls								
Section of Phase II RI Work Plan	5.1.1	5.1.2	5.1.3		5.2.1	5.2.2/5.2.4	5.2	5.2.3	5.2.5	5.3.1	5.3.2	5.4.1	5.4.2	5.4.3	5.4.4	5.5	5.6.3
Lithopone Ridges Area																	
SB-28/MW-41U/B				X	X			X		X	X			X	X		
SB-29	X			X						X	X			X	X		
SB-30/MW-30T	X			X		X				X	X	X		X	X		
SB-31				X						X	X		X	X	X		
SB-32	X			X						X	X			X	X		
HH-08R[4]																	
VPCDA																	
SB-44/MW-40U/T/B					X	X		X									
Bluff Area																	
SB-33/MW-31T						X											
SB-34/MW-32T						X											
SB-35/MW-33T						X											
SB-36/MW-34T						X											
W-12SR[5]							X										
North Ditch																	
ND-1																X	
ND-2																X	
ND-3																X	
ND-4																X	
ND-5																X	
Former Settling Ponds																	
SP-1																X	
SP-2																X	

Key:

UWBZ: Upper Water-Bearing Zone
TOLA: Top Of Lower Aquifer
BOLA: Base Of Lower Aquifer
IRM: Iron-Rich Material
TCLP: Toxicity Characteristic Leaching Procedure
SPLP: Synthetic Precipitation Leaching Procedure
U: Monitoring Well Screened within the UWBZ
T: Monitoring Well Screened within the TOLA
B: Monitoring Well Screened within the BOLA
UPSEA: Upland Portion of the Southeast Area

Note:

[1]Horizontal hydraulic conductivity tests will also be completed at existing monitoring wells PS-14, PS-15, and PS-16
[2]Replacement well for damaged PS-05
[3]Replacement wells for PZ-1 cluster abandoned during construction of the CAMU
[4]Replacement well (HH-08 was inadvertently abandoned)
[5]Replacement well for W12S

TABLE 5-2

Proposed Phase II RI Groundwater and Surface Water Sampling Locations
DePue Site
DePue, Illinois

Investigation	Groundwater[1]												Surface Water[1]
	UWBZ			TOLA			BOLA		Bluff Undiferentiated		Collection System and IRM Walls		Surface Water
Proposed or Existing Sample Location	Proposed Well	Existing Well	Replacement Well	Proposed Well	Existing Well	Replamement Well	Proposed Well	Existing Well	Existing Well	Replacement Well	Proposed Well	Existing Well	Proposed Location
Section of Phase II RI Work Plan	5.2.1			5.2.2/5.2.4			5.2.3/5.2.4		5.2.4		5.2.5		5.5
Western Area													
SB-1/MW-20B							X						
SB-3/MW-22T/B				X			X						
W5S					X								
PS-11					X								
Eastern Area													
SB-9/MW-23U/T	X			X									
SB-10/MW-24U	X												
SB-39/MW-38B							X						
SB-46/MW-43U	X												
W17S		X											
W17D								X					
HH-09					X								
Slag Pile Area													
SB-2/MW-21B							X						
SB-40/MW-35U/T	X			X							X		
SB-38/MW-37U	X												
SB-45/MW-42B							X						
PZ1SR			X										
PZ1IR						X							
PZ2S		X											
PZ2I					X								
PZ3S		X											
PZ3I					X								
PZ4S		X											
PZ4I					X								
HS3												X	
HS5												X	
HS6												X	
PS-17												X	
TW-1U											X		
TW-2U											X		
TW-5U											X		
TW-6U											X		
UPSEA													
SB-21/MW-25U/T/B	X			X			X						
SB-22/MW-26U/T/B	X			X			X						
SB-23/MW-27T				X									
SB-24/MW-28T				X									
SB-27/MW-29U/T/B	X			X			X						
SB-37/MW-36T				X									
HS11		X											
HS12		X											
HS13					X								
W18S		X											
W18D								X					
W19S		X											
W19D								X					
N003[2]		X											
N004[2]		X											
N005[2]		X											
N006[2]		X											
HS8												X	
HS9												X	
SB41/MW-39U	X										X		
TW-3U											X		
TW-4U											X		
TW-7U											X		
TW-8U											X		
Lithopone Ridges Area													
SB-30/MW-30T				X									
SB28/MW-41U/B	X						X						
HH-08R						X							
VPCDA													
SB44/MW-40U/T/B	X			X			X						
Bluff Area													
SB-33/MW-31T				X									
SB-34/MW-32T				X									
SB-35/MW-33T				X									
SB-36/MW-34T				X									
W1S									X				
W12SR										X			
W12D								X					
W2S									X				
W2D								X					
W3S									X				
W4S									X				
North Ditch													
ND-1													X
ND-2													X
ND-3													X
ND-4													X
ND-5													X
Former Settling Ponds													
SP-1													X
SP-2													X

Key:

UWBZ: Upper Water-Bearing Zone
TOLA: Top Of Lower Aquifer
BOLA: Base Of Lower Aquifer
IRM: Iron-rich Material
UPSEA: Upland Portion of the Southeast Area

U: Monitoring Well Screened within the UWBZ
T: Monitoring Well Screened within the TOLA
B: Monitoring Well Screened within the BOLA
HCOPCs: Human Health Constituents of Potential Concern

Note:

[1] All groundwater/surface water samples are being analyzed for HCOPCs listed in Table 4-1.

[2] Seep Location.

TABLE 5-3

Proposed Phase II RI IRM Wall Investigation Water Level Collection Locations
DePue Site
DePue, Illinois

Groundwater Collection System/IRM Wall Evaluation Locations

Water Levels and Groundwater Sampling

TW-1U
HS3S
TW-2U
TW-3U
TW-4U
HS5S
HS6S
PS17
HS8S
HS9S
MW-39U
MW-35U
TW-5U
TW-6U
TW-7U
TW-8U

Water Levels Only

MW-37U
W18S
PZ3S
PZ4S
HS11(S)

FIGURES

The appearance of some of the images

following this page is due to

Poor Quality Original Documents

and not the scanning or filming processes.

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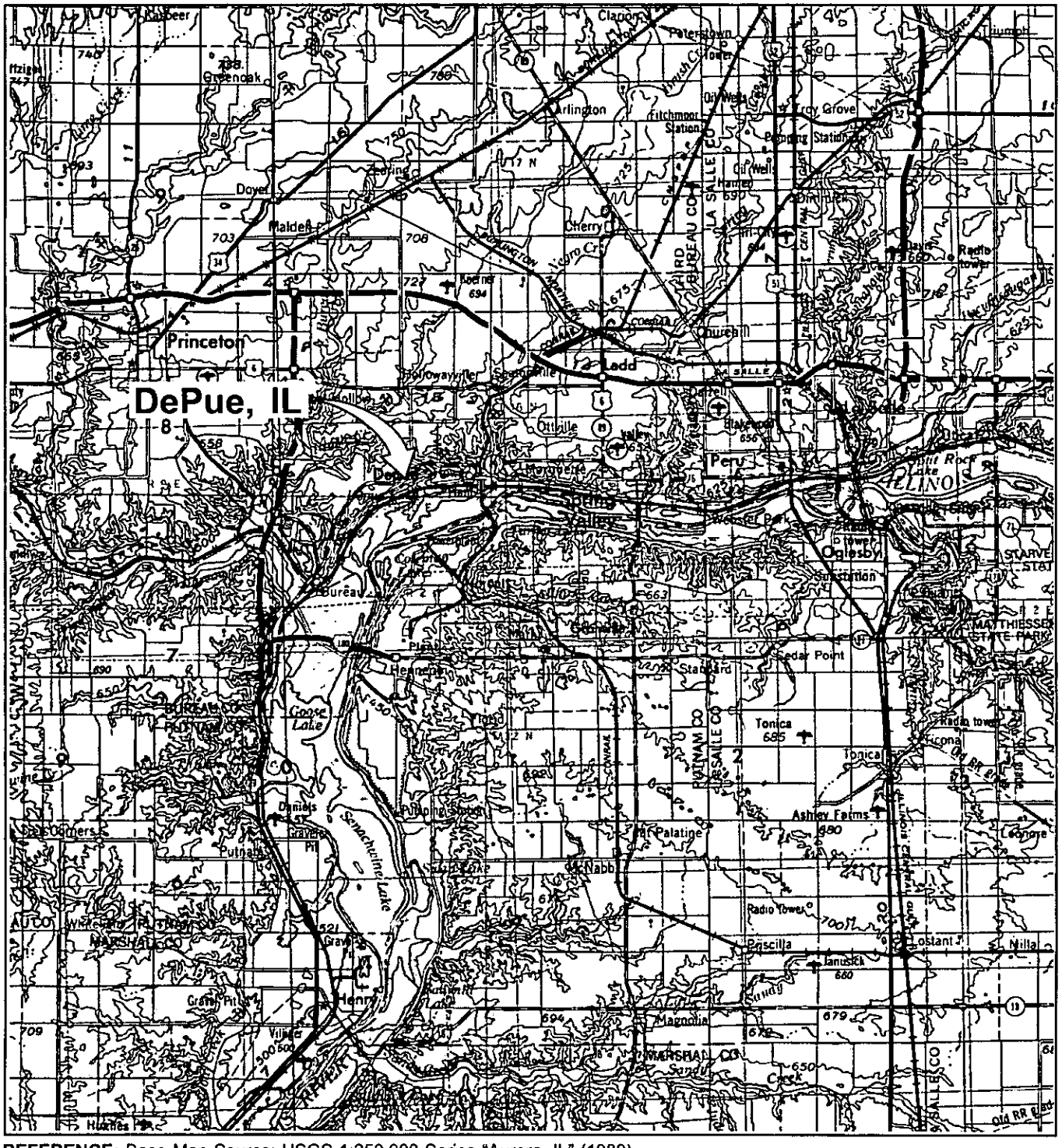
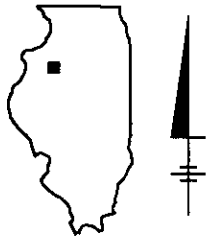


REFERENCE: Base Map Source: USGS 1:250,000 Series "Aurora, IL" (1980).

0 4 8

MILES



Area Location

02/25/04 SYR-D85-DJH
85521103/85521n01.cdr

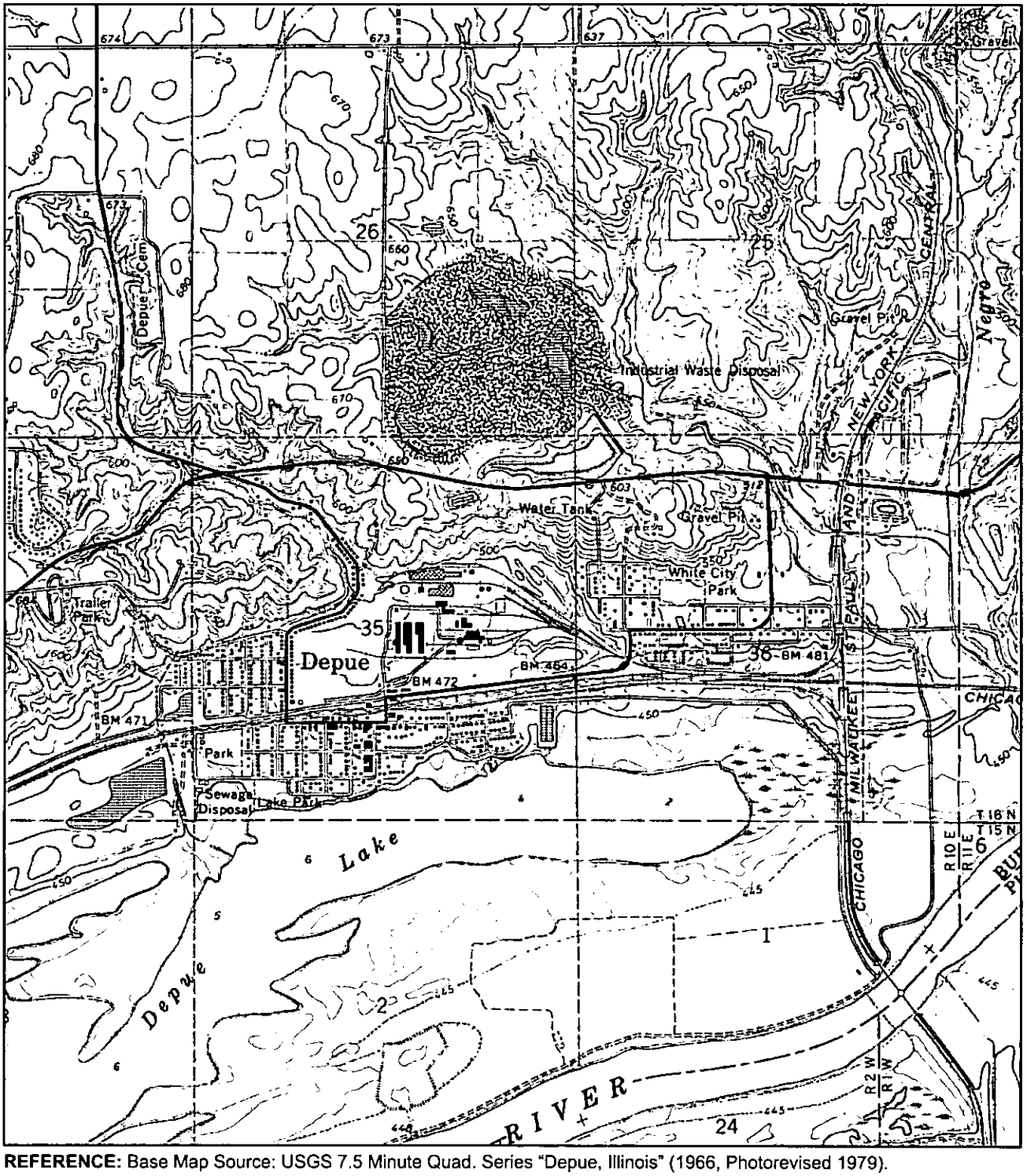
PHASE II REMEDIAL INVESTIGATION WORK PLAN

DEPUE SITE
DEPUE ILLINOIS

GENERAL LOCATION MAP

ENVIRON

FIGURE 1-1



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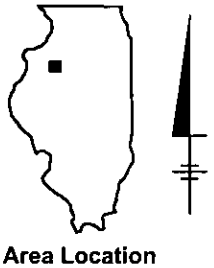
2000' 0 2000'

Approximate Scale: 1" = 2000'



Area Location

03/13/06 SYR-D85-DJH
85572001/85572N02.cdr

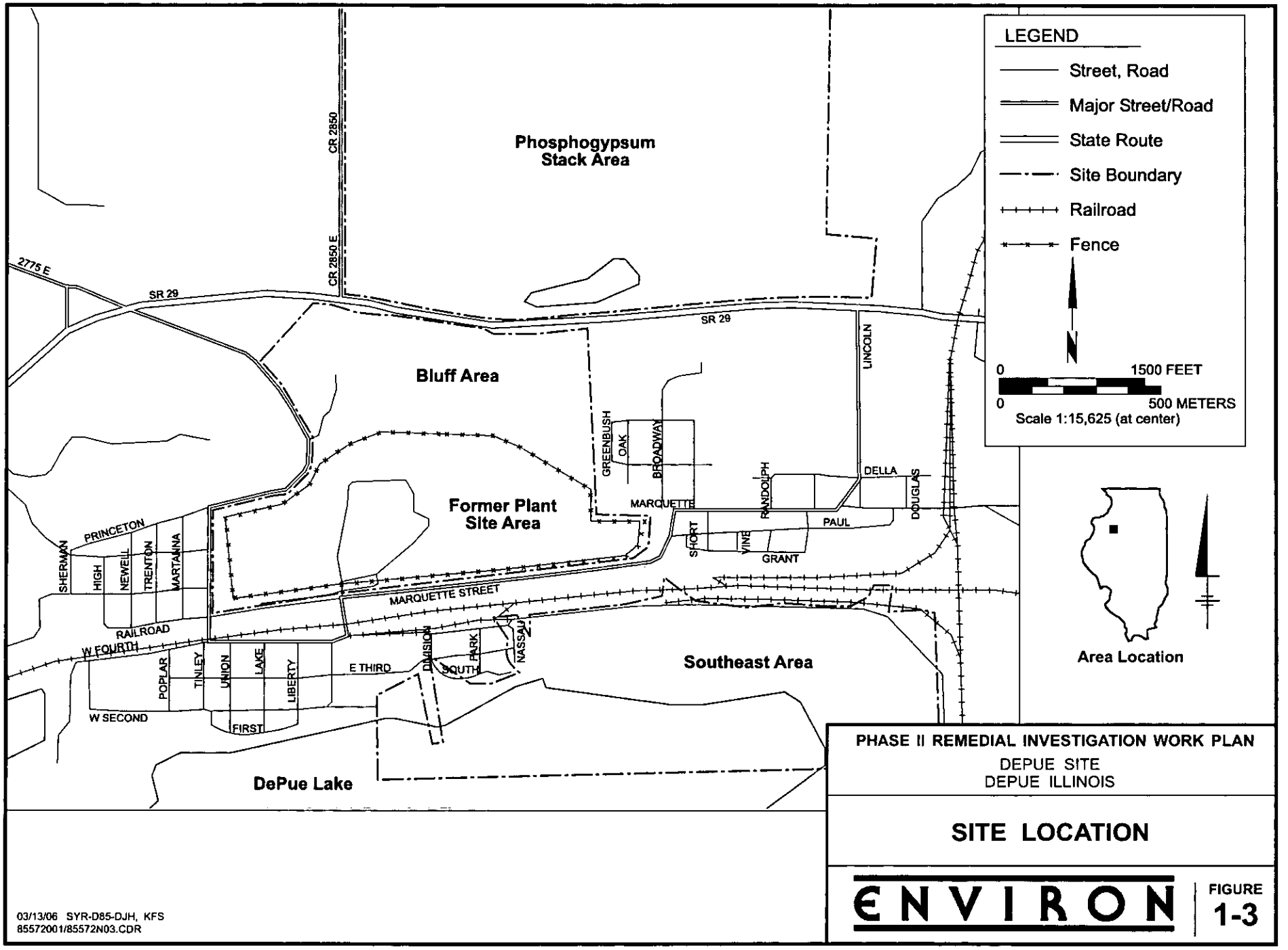
PHASE II REMEDIAL INVESTIGATION WORK PLAN

DEPUE SITE
DEPUE ILLINOIS

DEPUE AREA VICINITY

ENVIRON

FIGURE
1-2



PHASE II REMEDIAL INVESTIGATION WORK PLAN

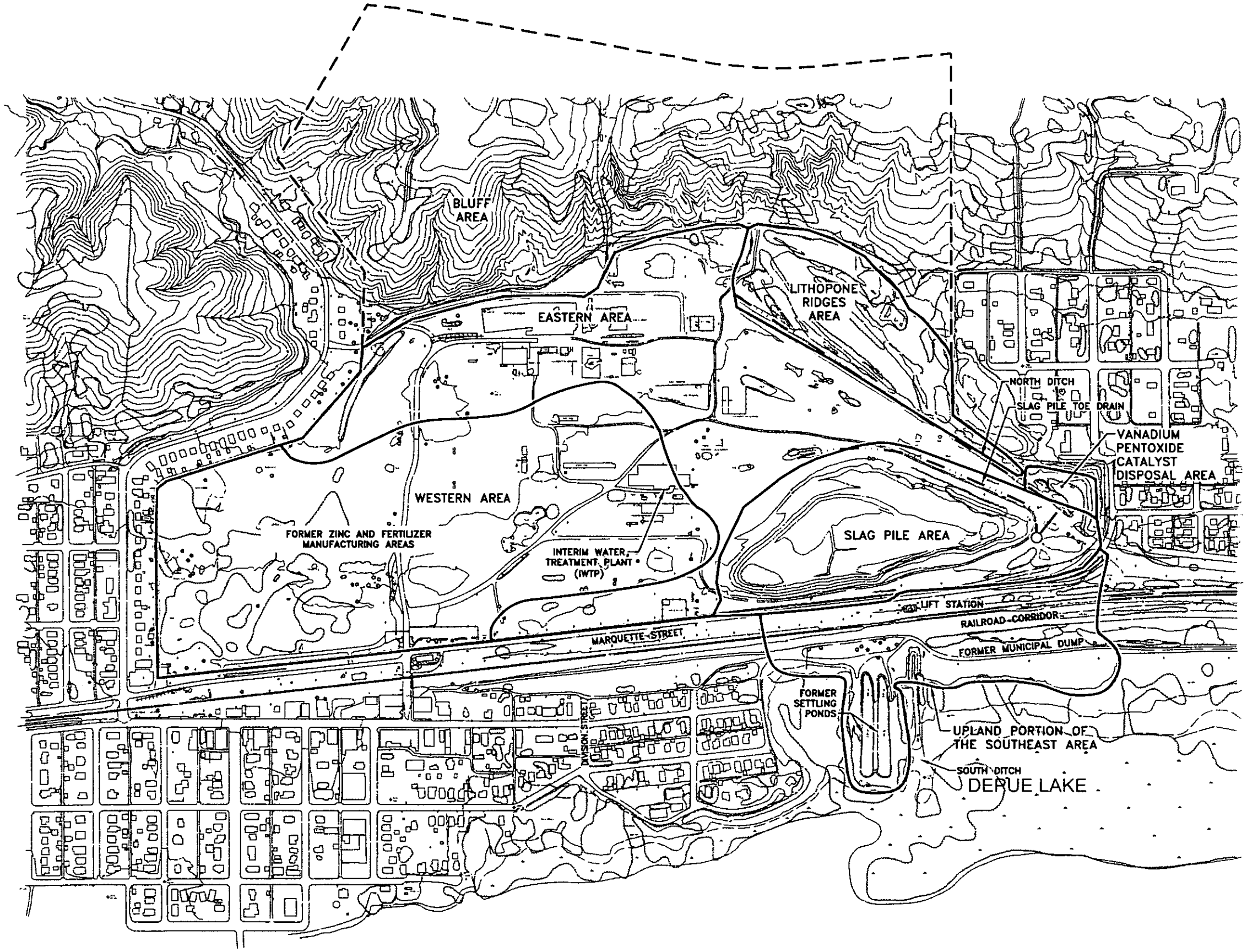
DEPUE SITE
DEPUE ILLINOIS

SITE LOCATION

ENVIRON

FIGURE 1-3

03/13/06 SYR-D85-DJH, KFS
85572001/85572N03.CDR



N
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LEGEND:
APPROXIMATE AREA OF HISTORICAL ACTIVITIES
APPROXIMATE AREA OF BLUFF AREA

NOTE:
BASE MAP FROM FIGURE 1 OF PHASE 1 SITE-WIDE REMEDIAL INVESTIGATION DATA REPORT, ADDENDUM 1 DATED JANUARY 30, 2001 AT A SCALE OF 1" = 400', PROVIDED BY GOLDER ASSOCIATES.

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SCALE IN FEET
500 250 0 500

ENVIRON

LAYOUT OF THE FORMER PLANT SITE AREA, SOUTHEAST AREA, AND BLUFF AREA
PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE:	CONTRACT NUMBER:		FIGURE
07/10/06	21-12046E2		2-1
DRAFTER: APR	APPROVED:	REVISED	

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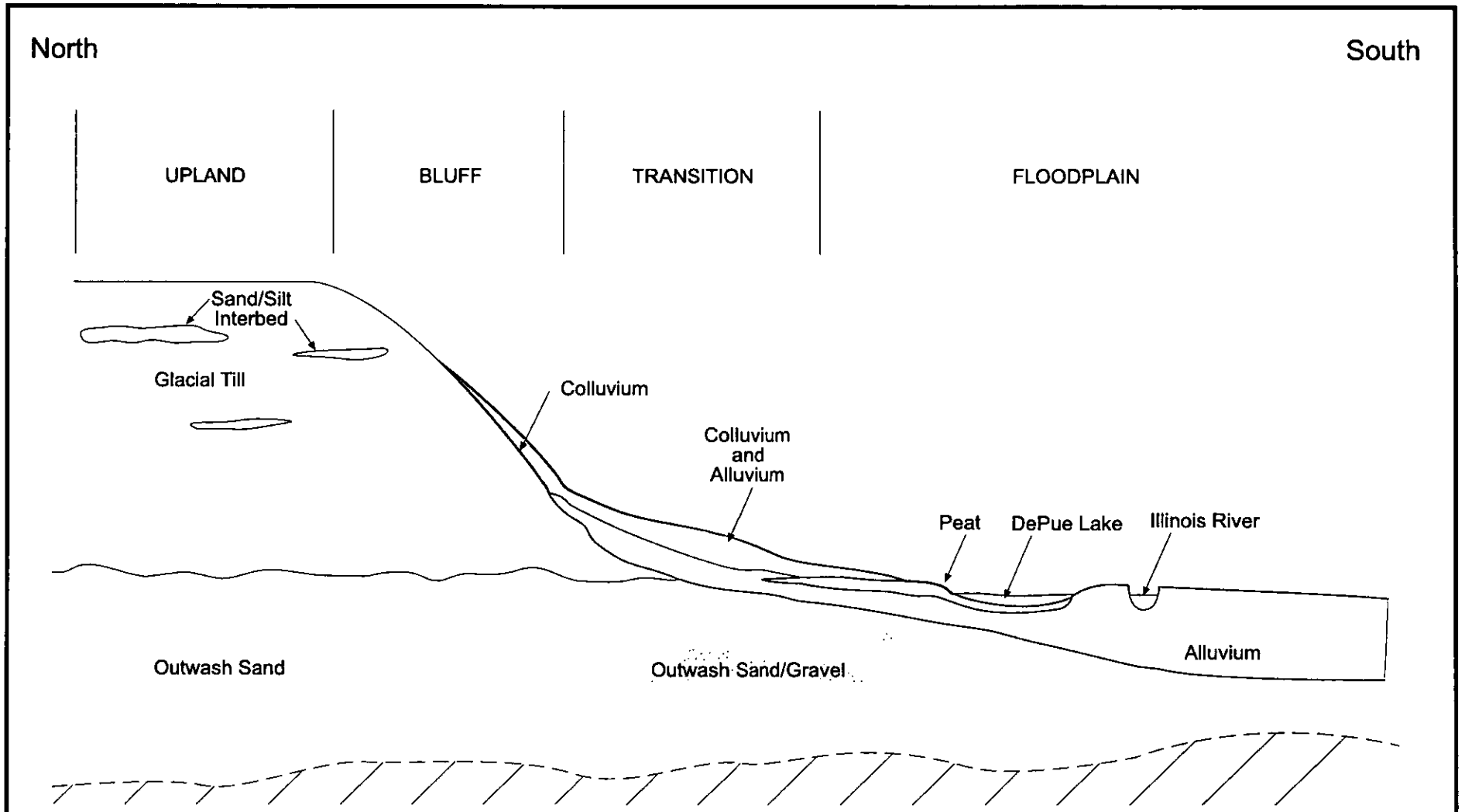


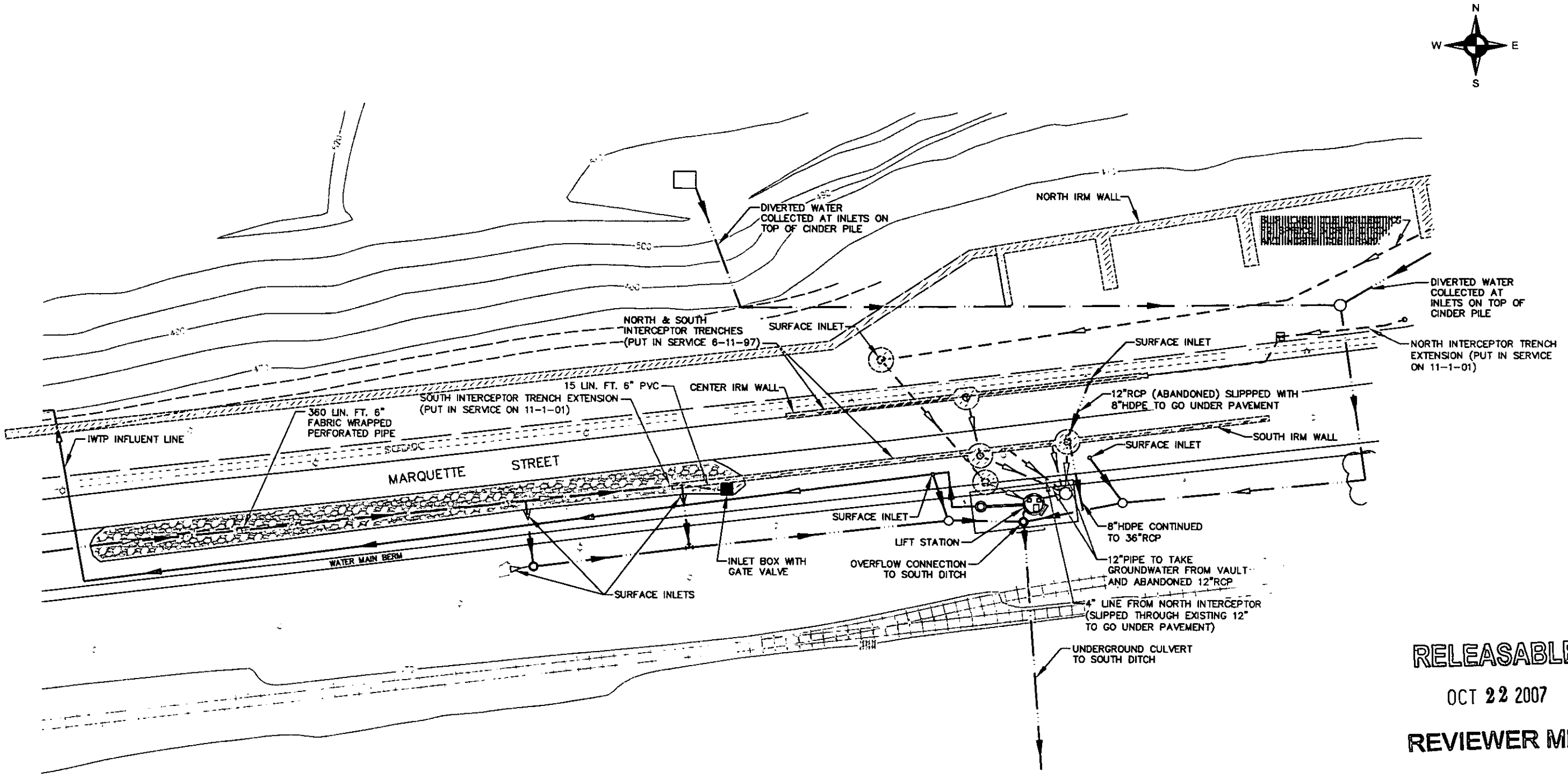
PHASE II REMEDIAL INVESTIGATION WORK PLAN

DEPUE SITE
DEPUE ILLINOIS

CONCEPTUAL GEOLOGIC CROSS-SECTION

ENVIRON

FIGURE
2-2



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OCT 22 2007

REVIEWER MD

SCALE IN FEET

60 30 0 60

LEGEND:

- DIVERTED WATER
- WATER TO BE TREATED
- INFLUENT TO IWTP

NOTES:

1. BASE MAP PREPARED FROM ELECTRONIC FILE OF DRAWING NO. 95-13562, AT A SCALE OF 1"=50', DATED 6/19/03 BY "FRANK AND WEST ENVIRONMENTAL ENGINEERS, INC.". ALL LOCATIONS ARE APPROXIMATE.
2. WESTERN EXTENT OF NORTH IRM WALL WILL BE CONFIRMED DURING THE PHASE II REMEDIAL INVESTIGATION.

ENVIRON

MARQUETTE STREET GROUNDWATER COLLECTION STATION AS CONFIGURED IN JUNE 2003

PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE:	CONTRACT NUMBER:		FIGURE
07/10/06	21-12046E2		2-3
DRAFTER: APR	APPROVED:	REVISED:	

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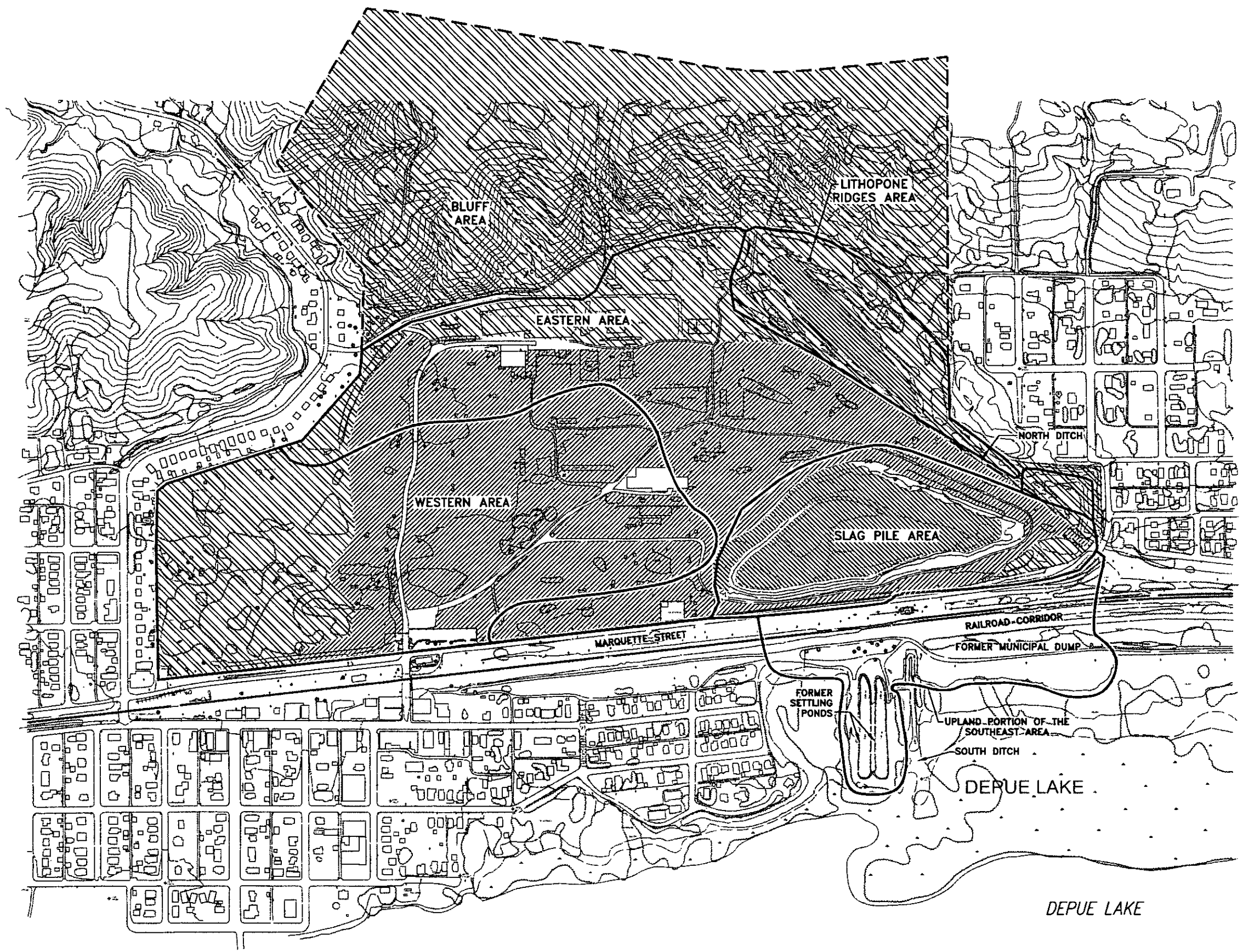

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LEGEND:

- APPROXIMATE AREA OF HISTORICAL ACTIVITIES
- APPROXIMATE AREA OF BLUFF AREA
- AREAS VEGETATED NATURALLY
- AREAS SEEDED AND VEGETATED BY THE DEPUE GROUP
- AREAS PREVIOUSLY SEEDED AND VEGETATED

NOTE:

BASE MAP FROM FIGURE 1 OF PHASE 1 SITE-WIDE REMEDIAL INVESTIGATION DATA REPORT, ADDENDUM 1 DATED JANUARY 30, 2001 AT A SCALE OF 1" = 400', PROVIDED BY GOLDER ASSOCIATES.

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SCALE IN FEET

500 250 0 500

ENVIRON

SITE REVEGETATION MAP

PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE:	CONTRACT NUMBER:		FIGURE
07/10/06	21-12046E2		3-1
DRAFTER: APR	APPROVED:	REVISED:	

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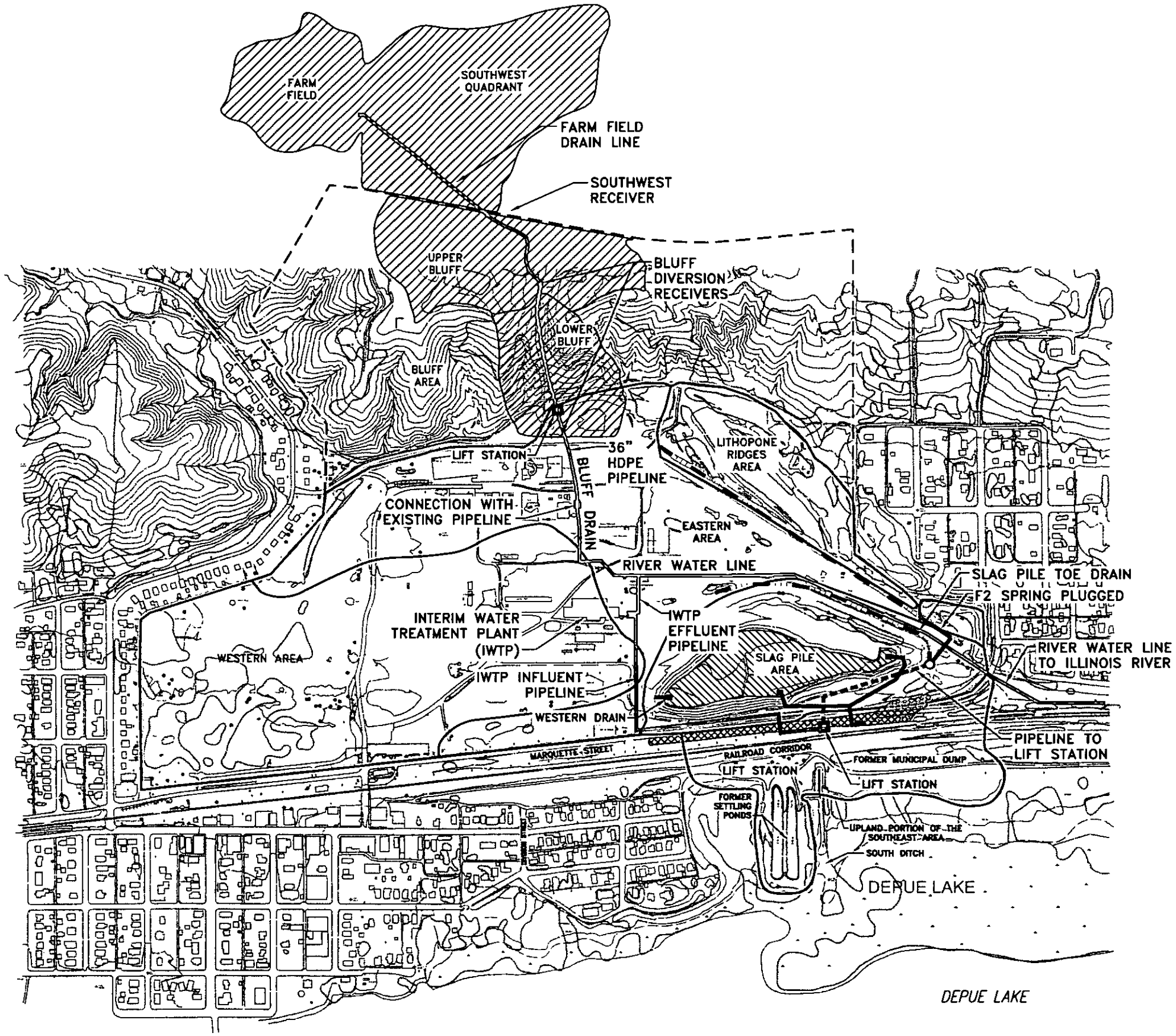

N
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LEGEND:

- APPROXIMATE AREA OF HISTORICAL ACTIVITIES
- APPROXIMATE AREA OF BLUFF AREA
- UPPER AND LOWER BLUFF DRAINAGE AREA
- TOP OF SLAG PILE
- MARQUETTE STREET DRAINAGE
- PIPELINE (SEE NOTE 2)
- RIVER WATER & BLUFF DRAIN LINE (SEE NOTE 2)
- IWTP EFFLUENT PIPELINE (SEE NOTE 2)
- IWTP INFLUENT PIPELINE (SEE NOTE 2)
- DRAINAGE DITCH

NOTES:

1. BASE MAP FROM FIGURE 1 OF PHASE 1 SITE-WIDE REMEDIAL INVESTIGATION DATA REPORT, ADDENDUM 1 DATED JANUARY 30, 2001 AT A SCALE OF 1" = 400', PROVIDED BY GOLDER ASSOCIATES.
2. PIPELINES COPIED FROM ELECTRONIC FILE OF DRAWING NO. 94-11456.DWG BY "FRANK & WEST ENVIRONMENTAL ENGINEERS, INC.", AT A SCALE OF 1"= 475'.
3. DRAINAGE AREAS COPIED FROM HARD COPY OF DRAWING NO. FIG 1-10A.DWG BY "TERRA ENVIRONMENTAL SERVICES, INC.", AT A SCALE OF 1" = 400', DATED 8/22/2003.
4. WESTERN DRAIN LOCATED IN THE SLAG PILE AREA DIGITIZED FROM PAPER COPY OF DRAWING BY "KING ENGINEERING", AT AN APPROXIMATE SCALE OF 1" = 50', UNDATED, TITLED PLAN VIEW SHEET 2 OF 7, AS PROVIDED BY THE CLIENT.
5. ALL LOCATIONS ARE APPROXIMATE.

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SCALE IN FEET

600 300 0 600

ENVIRON

CLEAN WATER DIVERSION

PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE:	CONTRACT NUMBER:		FIGURE
07/10/06	21-12046E2		3-2
DRAFTER: APR	APPROVED:	REVISED:	

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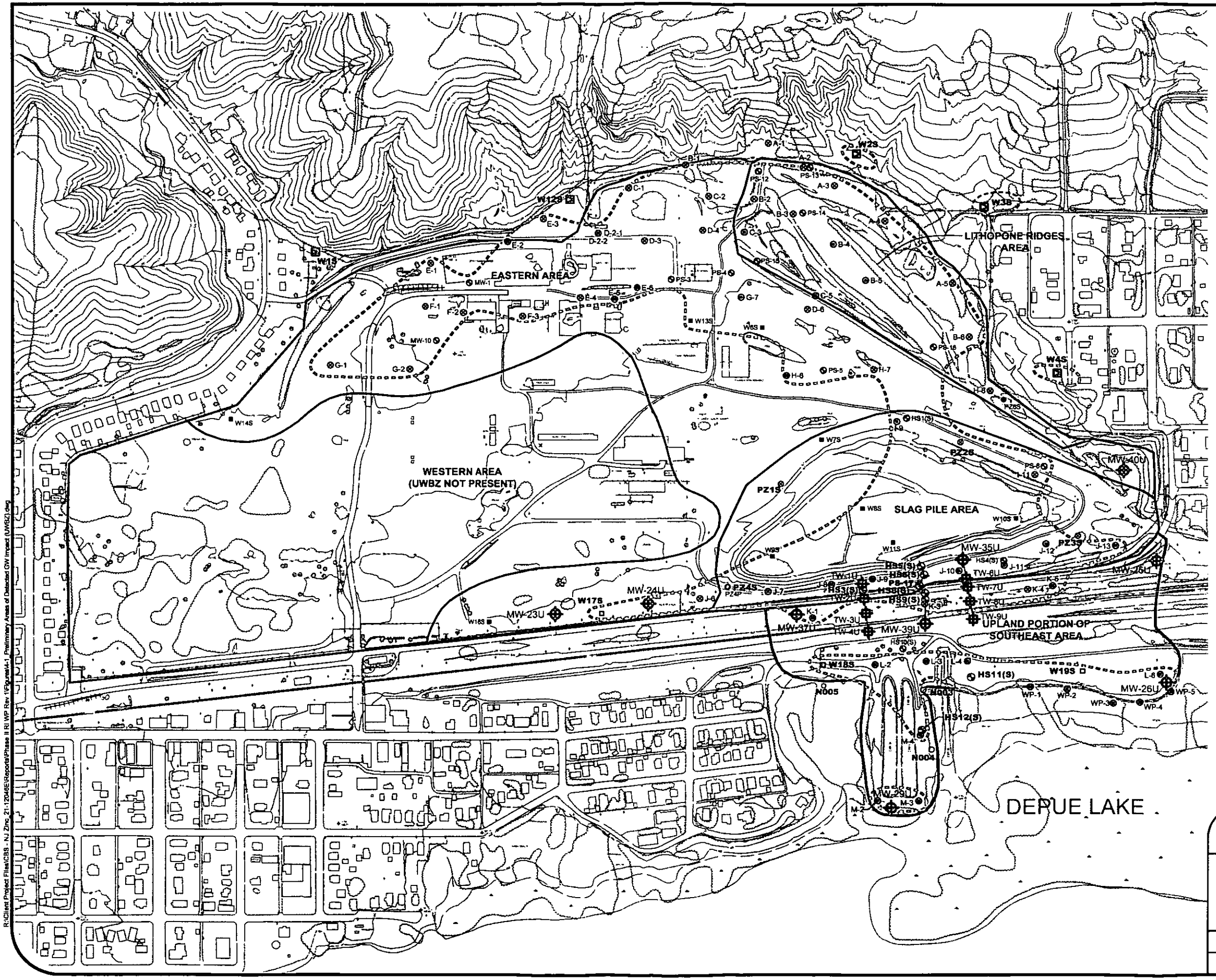

LEGEND

- INVESTIGATION AREA BOUNDARY
- PRELIMINARY EXTENT OF DETECTED GROUNDWATER IMPACT ABOVE HCOPC SCREENING VALUE

PHASE I RI SAMPLING LOCATIONS:

- BORING (UWBZ)
- BORING (AQUITARD)
- W11S ■ MONITORING WELL (UWBZ OR AQUITARD)
- W3S ⊠ MONITORING WELL (BLUFF UNDIFFERENTIATED)
- PZ4S ● PIEZOMETER (UWBZ OR AQUITARD)

OTHER LOCATIONS

- HS11(S) EXISTING MONITORING WELL OR PIEZOMETER (UWBZ OR AQUITARD)
- PROPOSED PHASE II RI MONITORING WELL (UWBZ)
- PROPOSED TEMPORARY WELL LOCATION (UWBZ)
- PROPOSED GROUNDWATER AND SEEP SAMPLING LOCATION (UWBZ)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BLUFF UNDIFFERENTIATED)

UWBZ = UPPER WATER-BEARING ZONE

HCOPC = HUMAN HEALTH CONSTITUENT OF POTENTIAL CONCERN

NOTES:

1. THE PRELIMINARY EXTENT OF DETECTED GROUNDWATER IMPACT IS BASED ON THE DATA SUMMARIZED IN THE SECTION 6 TABLES IN THE REVISED PHASE I REMEDIAL INVESTIGATION REPORT, PREPARED BY ENVIRON, DATED MAY 2006. DETAILED DATA ARE PRESENTED IN THE CUMULATIVE PHASE I RI DATA REPORT, PREPARED BY GOLDER ASSOCIATES, INC., DATED 2002.
2. THE HCOPCs DETECTED IN THE OUTLINED AREAS INCLUDE: ARSENIC, CADMIUM, FLUORIDE, IRON, LEAD, ZINC, AND SULFATE.

MAP SOURCE: GOLDER ASSOCIATES INC. AND CHAMLIN & ASSOCIATES; LOCATIONS OF ROADS, RAILWAYS, BUILDINGS, AND OTHER INFRASTRUCTURE EXTRACTED FROM AERIAL PHOTOGRAPHS.

SCALE IN FEET

0 200 400 800

ENVIRON

PRELIMINARY AREAS OF DETECTED GROUNDWATER IMPACT UWBZ, AQUITARD, AND BLUFF

DEPUE SITE

DATE:	CONTRACT NUMBER:		FIGURE
09/19/07	21-12046E2		4-1
DRAFTER: APR	APPROVED:	REVISED:	

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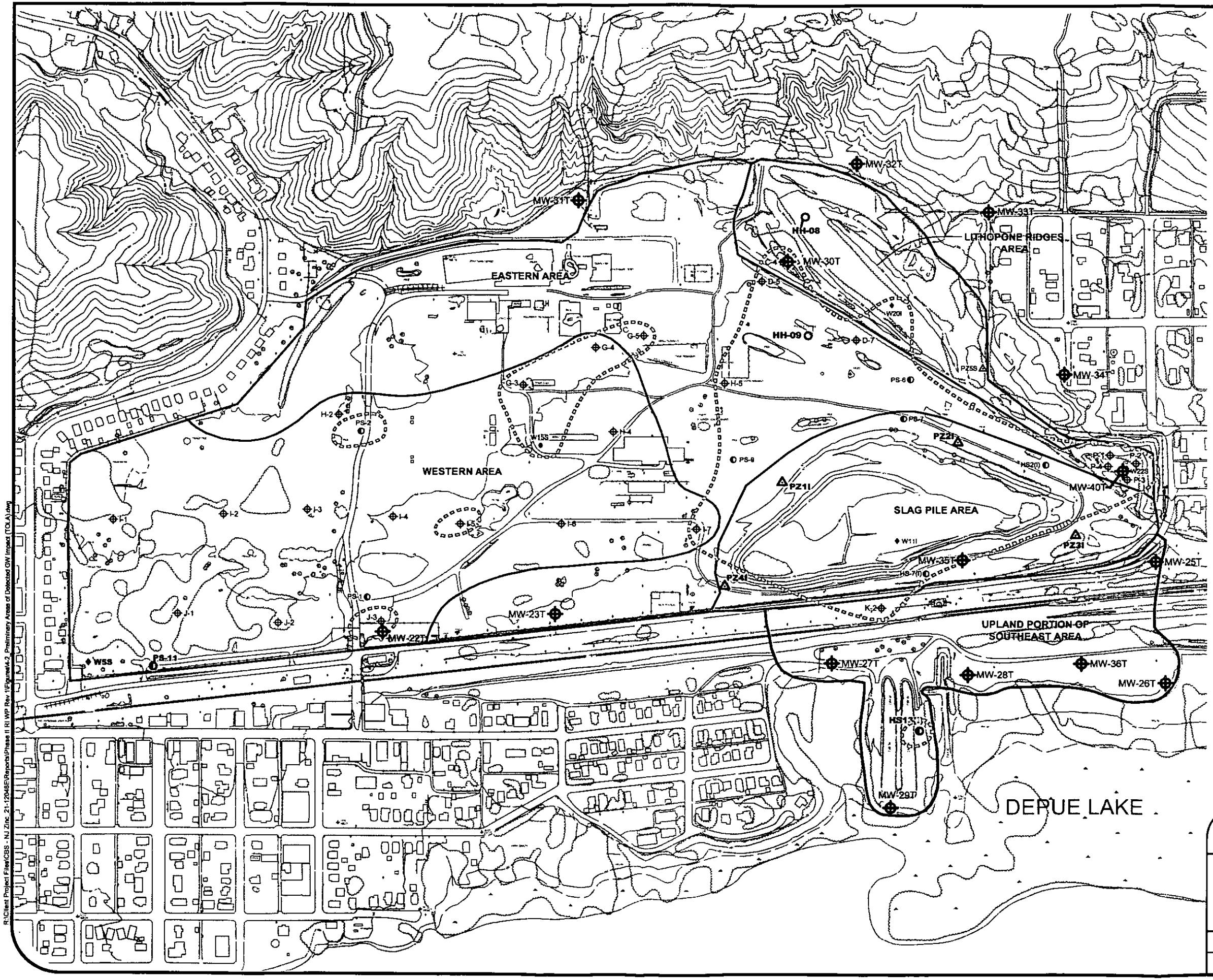
PRELIMINARY



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LEGEND

- INVESTIGATION AREA BOUNDARY
- PRELIMINARY EXTENT OF DETECTED GROUNDWATER IMPACT ABOVE HCOPC SCREENING VALUE

PHASE I RI SAMPLING LOCATIONS:

- BORING (TOLA)
- W5S MONITORING WELL (TOLA)
- PZ4I PIEZOMETER (TOLA)

OTHER LOCATIONS

- PS-11 EXISTING MONITORING WELL OR PIEZOMETER (TOLA)
- PROPOSED PHASE II RI MONITORING WELL (TOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (TOLA)

TOLA = TOP OF LOWER AQUIFER

HCOPC = HUMAN HEALTH CONSTITUENT OF POTENTIAL CONCERN

NOTES:

1. THE PRELIMINARY EXTENT OF DETECTED GROUNDWATER IMPACT IS BASED ON THE DATA SUMMARIZED IN THE SECTION 6 TABLES IN THE REVISED PHASE I REMEDIAL INVESTIGATION REPORT, PREPARED BY ENVIRON, DATED MAY 2006. DETAILED DATA ARE PRESENTED IN THE CUMULATIVE PHASE I RI DATA REPORT, PREPARED BY GOLDER ASSOCIATES, INC., DATED 2002.
2. THE HCOPCs DETECTED IN THE OUTLINED AREAS INCLUDE: ARSENIC, CADMIUM, FLUORIDE, GROSS ALPHA, AND SULFATE.

RELEASABLE

OCT 22 2007

REVIEWER MD

MAP SOURCE: GOLDER ASSOCIATES INC. AND CHAMLIN & ASSOCIATES; LOCATIONS OF ROADS, RAILWAYS, BUILDINGS, AND OTHER INFRASTRUCTURE EXTRACTED FROM AERIAL PHOTOGRAPHS.

SCALE IN FEET

0 200 400 800

ENVIRON

PRELIMINARY AREAS OF DETECTED GROUNDWATER IMPACT TOP OF LOWER AQUIFER

DEPUE SITE

DATE:	CONTRACT NUMBER:		FIGURE
09/19/07	21-12046E2		4-2
DRAFTER: APR	APPROVED:	REVISED:	

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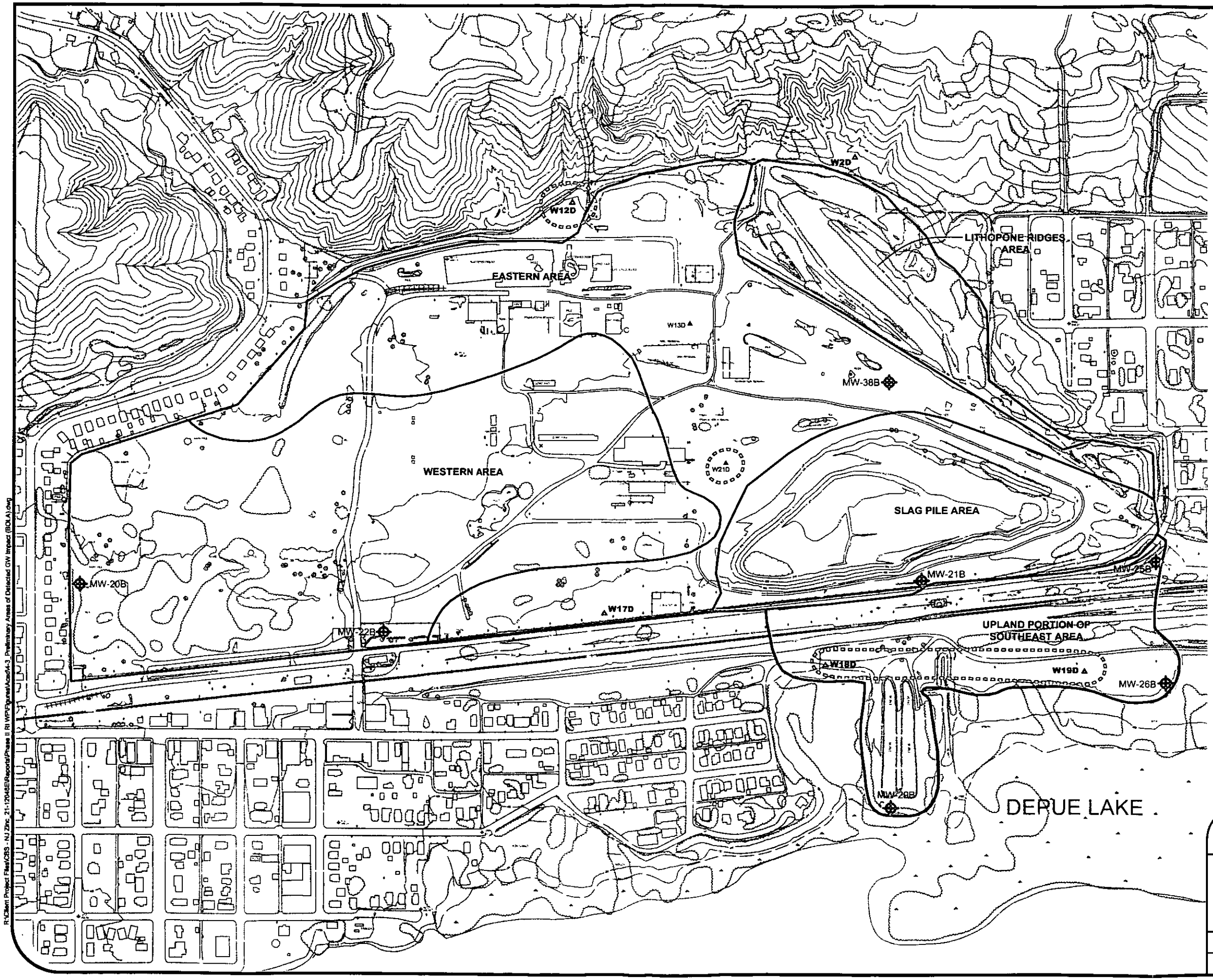

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PRELIMINARY

N
W E
S

LEGEND

- INVESTIGATION AREA BOUNDARY
- PRELIMINARY EXTENT OF DETECTED GROUNDWATER IMPACT ABOVE HCOPC SCREENING VALUE

PHASE I RI SAMPLING LOCATIONS:

- W2D ▲ MONITORING WELL (BOLA)

OTHER LOCATIONS

- PROPOSED PHASE II RI MONITORING WELL (BOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BOLA)

BOLA = BASE OF LOWER AQUIFER

HCOPC = HUMAN HEALTH CONSTITUENT OF POTENTIAL CONCERN

NOTES:

1. THE PRELIMINARY EXTENT OF DETECTED GROUNDWATER IMPACT IS BASED ON THE DATA SUMMARIZED IN THE SECTION 6 TABLES IN THE REVISED PHASE I REMEDIAL INVESTIGATION REPORT, PREPARED BY ENVIRON, DATED MAY 2006. DETAILED DATA ARE PRESENTED IN THE CUMULATIVE PHASE I RI DATA REPORT, PREPARED BY GOLDER ASSOCIATES, INC., DATED 2002.
2. THE HCOPCs DETECTED IN THE OUTLINED AREAS INCLUDE: ARSENIC, IRON, AND SULFATE.

MAP SOURCE: GOLDER ASSOCIATES INC. AND CHAMLIN & ASSOCIATES; LOCATIONS OF ROADS, RAILWAYS, BUILDINGS, AND OTHER INFRASTRUCTURE EXTRACTED FROM AERIAL PHOTOGRAPHS.

SCALE IN FEET

0 200 400 800

ENVIRON

PRELIMINARY AREAS OF DETECTED GROUNDWATER IMPACT BASE OF LOWER AQUIFER

DEPUE SITE

DATE:	CONTRACT NUMBER:		FIGURE
08/14/06	21-12046E2		4-3
DRAFTER: APR	APPROVED:	REVISED:	

SEE LARGE FORMAT MAP OR PLAN SHEET

DESCRIPTION:

1)ollo300003 PC 10/19/2007 NewJersey Zinc/Mobil Chemical 5-1

2)ollo300003 PC 10/19 2007 New Jersey Zinc/Mobil Chemical 5-2

APPENDIX A

Correspondence Between ENVIRON and the Illinois Environmental Protection Agency

ENVIRON

January 8, 2007

Mr. Richard Lange
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

Re: Phase II Remedial Investigation Work Plan
DePue Site, DePue, Illinois

Dear Mr. Lange:

This letter has been prepared by ENVIRON International Corporation ("ENVIRON") on behalf of the DePue Group to address your comments on ENVIRON's August 2006 *Work Plan for Phase II Remedial Investigation* (the "Phase II RI Work Plan"), which were transmitted in an October 20, 2006 email and discussed during our November 30, 2006 meeting. Your comments are reproduced below in italic type with ENVIRON's response following indented and in regular type. Upon your agreement with these responses and completion of the data usability evaluation, a final Phase II RI Work Plan will be prepared and implemented as soon as possible.

Several of the comments listed below request additional sampling in the interior of the site. As discussed during the November 30, 2006 meeting, the primary objective of the remedial investigation (RI) is to define the nature and extent of impacts at the site. The data collected during Phase I of the RI have provided sufficient information about the nature of impacts; however, data gaps remain regarding extent. As a result the primary objective of the Phase II RI is to further investigate the extent of impacts. As discussed below in response to specific comments, some of the IEPA's suggested additional sampling locations will be added; however, those that will not serve to further define the extent of impacts have not been added.

Section 2.1 Bluff Area. *The Bluff Area contains highly stressed vegetation and will require a soil investigation either in the FPSA RI or as part of the Off-Site Soils investigations. The text should address this.*

As discussed in Section 1.1 of the Phase II RI Work Plan, the Bluff Area soil sampling will be performed during the Off-Site Soils (OU4) investigation. The following sentence will be added to the end of Section 2.1 to clarify: "The Off-Site Soils (OU4) investigation will include soil sampling in the Bluff Area."

Section 4.0 Data Gap Identification:

a) *A table listing the ECOPCs should also be included.*

The ecological constituents of potential concern (ECOPCs) will be identified and evaluated during the screening level ecological risk assessment (ERA). A separate companion work plan will be prepared for performing the screening level ERA.

b) *It should be noted that the list of HCOPCs has still not been agreed upon because a relative risk screening process was used as one of the steps in development of the current list.*

If the relative risk screening method is removed from the groundwater screening process, aluminum and phosphorus are the only compounds that require addition to the list of HCOPCs for the groundwater monitoring. The screening process in ENVIRON's May 2006 *Revised Phase I Remedial Investigation Report* (the "Revised Phase I RI Report") contained

three steps: (1) comparison to background concentrations contained in the Tiered Approach to Corrective Action (TACO) regulations, (2) comparison to risk-based screening values, and (3) human health constituents of potential concern (HCOPC) refinement. Step 3, the HCOPC refinement, contained six criteria (i.e., frequency of detection, degree of exceedance, potential site relatedness, presence in other media, chemical specific factors, and relative risk screening).

The preliminary groundwater HCOPCs identified after the first two steps are listed in Table 1 for each of the three areas. The list was further refined by evaluating the first two criteria in the HCOPC refinement step: frequency of detection, and degree of exceedance (i.e., the magnitude that the maximum detected concentration was above the screening value). The frequency of detection and degree of exceedance were evaluated using the criteria identified in Section 5.3.1 of the Revised Phase I RI Report. If the frequency of detection was less than 10%, the parameter was not retained as an HCOPC. If the frequency of detection was greater than 10%, the maximum detected concentration was compared to the screening value. If the maximum detected concentration was less than an order of magnitude (i.e., 10 times) above the screening value, the parameter was not retained as an HCOPC as part of the degree of exceedance evaluation. The data used for the screening are listed on Table 1. As a result of the screening, aluminum will be added to the list of HCOPCs.

The HCOPCs that were identified as potentially site related in the Revised Phase I RI Report are arsenic, cadmium, lead, zinc, and phosphorus. The HCOPC list in the Phase II RI Work Plan included all of these except for phosphorus; therefore, phosphorus will be added to the list of HCOPCs.

The remaining criteria, presence in other media, chemical-specific factors, and relative risk screening were not used to further adjust the list of HCOPCs. Presence in other media was not used because the HCOPC list will only be used for groundwater monitoring. Chemical-specific factors were not used because no factors were identified in the Revised Phase I RI Report. The relative risk screening was not used in response to your comment.

c) *Figures 4-1 and 4-2 do not include groundwater results from water samples collected from temporary wells in soil borings that were not completed as monitoring wells or piezometers. In many cases, water samples from these borings contained concentrations of contaminants above HCOPC screening values. In Figure 4-3 a radium228 exceedance in well W13D and manganese exceedances in W2D and W17D are ignored. Therefore the figures do not accurately reflect the extent of detected groundwater impacts.*

The DePue Group will revise Figures 4-1 and 4-2 to include groundwater results from the temporary wells. The Phase II RI Work Plan proposes permanent wells near the location of some historical temporary wells. Results from temporary wells may be superseded by results of nearby permanent wells during Phase II RI reporting.

d) *The "data usability evaluation" discussed in the fourth paragraph must be completed and approved by the IL EPA prior to finalizing the subject work plan. Absent this sequenced finalization, development and implementation, a Phase III investigation can almost be assured. We MUST complete the FPSA RI effort without setting ourselves up for additional work that can be avoided by planning and properly sequenced implementation.*

The first steps of the data usability evaluation have been completed. The reports for all data presented in the Revised Phase I RI Report were reviewed. The reports contained summaries

of the validation results and descriptions of the methods used to validate the data. The details of the validation are being evaluated to determine the usability of the data. When the data usability evaluation is completed, a letter summarizing the results of the evaluation will be submitted under separate cover.

e) *The Phase I data indicates that the BOLA, TOLA and UWBZ have been impacted by the FPSA. This section of the Workplan mentions gaps associated with the UWBZ and TOLA, but ignores the BOLA. In addition to concentrations of arsenic, iron, sulfate, manganese and radium 228 that exceed screening values, the BOLA has elevated concentrations of zinc, orthophosphate, phosphorous, fluoride, potassium, K-nitrogen, and sodium particularly in downgradient wells W21D, W18D and W19D. Determining the extent and mechanism of BOLA impacts as well as it's interaction with the TOLA and potential discharge points should be an objective for the Phase II efforts.*

As stated in the work plan and discussed during the June 15, 2006 and November 30, 2006 meetings, the focus of the Phase II Work Plan is to provide the necessary data for definition of nature, extent, groundwater flow and transport mechanisms, and subsequently, remedy selection. The objectives are described in greater detail in the introductory paragraphs of this letter. As discussed above, those additional locations that will not serve to further define the extent of impact have not been added. The work plan includes installation of seven additional wells screened within the BOLA to complete the delineation of impacts in the BOLA along the southern boundary of the FPSA and UPSEA. Four of these additional monitoring wells will be nested with UWBZ and/or TOLA wells to evaluate the potential interaction between the three zones and the mechanisms of BOLA impacts.

f) *The text mentions investigating the potential for the FPSA to impact groundwater in the Bluff Area. What about also investigating the potential for impacts from the Bluff Area and Gypstack on the FPSA? Several existing wells along the base of the bluff, upgradient of known source areas, appear to have elevated HCOPCs. When will the hydrogeologic and water quality conditions of the Gypstack, Bluff and FPSA be integrated into one comprehensive picture?*

Wells are proposed for installation in the Bluff Area just upgradient of the FPSA. These wells will be used to evaluate potential upgradient impacts on the FPSA. In addition, a work plan to investigate the off-site groundwater from the Gypstack is being prepared. Data collected from each area will ultimately be integrated to evaluate the nature and extent of potential impacts, groundwater flow, and transport mechanisms.

***Section 5.0 Phase II Field Programs; General Comment**: The Phase I groundwater data suggest there are at least four separate source areas for groundwater contamination of one or more of the UWBZ, TOLA and BOLA. These are the Slag Pile, Lithopone Ridges, VPCDA, and the Acid Plant area. Other contributions of elevated concentrations to these aquifer units are frequently seen along the south property line of the FPSA and at the toe of the Bluff Area. Typically, higher concentrations of contaminants in each of the aquifer units are observed in the general areas shown in the attached figure. An acceptable approach would be, where space allows, to place one or more well nests each consisting of UWBZ/TOLA/BOLA wells at locations upgradient, within the source area, downgradient mid-point along the flow path and at the downgradient property boundary of the FPSA, for each of the source/suspected source areas.*

As discussed during the June 15, 2006 and November 30, 2006 meetings, the focus of the Phase II Work Plan is designed to provide the necessary data for definition of nature, extent,

groundwater flow and transport mechanisms, and subsequently, remedy selection. It is not designed to investigate individual areas of localized variability within the FPSA with the exception of the Slag Pile Area and the Lithopone Ridges Area. As a result, the locations proposed for installation of new wells are primarily located along the perimeter of the FPSA and UPSEA and have been selected to address specific issues raised in prior IEPA comments on the Phase I RI report and this work plan, as well as to address the data gaps identified in the Phase I RI report.

***Section 5.1.1 Aquitard Evaluation**: Boring E5 in the Acid Plant area had significant UWBZ concentrations and there are significant TOLA concentrations downgradient of this point. An aquitard evaluation (with Shelby Tube) in this area either as a separate boring or in conjunction with installation of additional wells is requested.*

As discussed in the response to the comment on Section 5.0 above, the objective of the Phase II Work Plan is to provide the necessary data for definition of nature, extent, groundwater flow, and transport mechanisms. Some limited geotechnical testing (Atterberg Limits) was performed at E5 during the Phase I RI. In addition, the collection of additional geotechnical samples is proposed in the area surrounding boring E-5. Therefore, further investigations of the area around boring E5 are not needed to complete definition of the nature and extent of impacts relevant to this Phase II RI.

***Section 5.1.2 UWBZ Evaluation**:*

a) *If the UWBZ is present at SB-9 or SB-10, since these borings will go through the aquitard, a new borehole should be drilled for the UWBZ well installation.*

   At SB-9 or SB-10, separate boreholes will be drilled if UWBZ wells are installed at these locations.

b) *Historic utility trenches and sewers cross the FPSA property boundary into offsite areas. The potential for these to act as preferential flow paths must be assessed in the Phase II RI?*

   The DePue Group will review historical drawings of the plant and utility abandonment records including the utility drawing provided in your December 4, 2006 email titled 1904Topowhistoricoffsitedrains_v2 (2).pdf. This information will be used to identify the locations of utilities trenches and sewers leaving the plant. During test pit work related to the IRM wall, test pits will also be excavated to evaluate areas where utilities are suspected to leave the site and for the evaluation of preferential pathways. This information will be considered during the FS process for its impact on potential remedies.

***Section 5.2 Groundwater Investigation, General Comments**:*

a) *Since it will be more than six years since comprehensive water quality sampling has been performed, it is strongly recommended that after installation of Phase II wells, all existing UWBZ, TOLA, and BOLA wells be sampled, not just a select few as proposed in the Workplan. For subsequent quarterly sampling a reduced list of wells could be considered by the Agency following review of the 1st round data set.*

   The proposed wells were selected for monitoring in the Phase II RI Work Plan because they are needed to complete definition of the nature and extent of ground water quality impacts and for evaluating the current groundwater conditions relevant to the objectives of the Phase II investigation as stated above. The wells that were not proposed for sampling are primarily located in the interior of the FPSA or are near wells that are currently proposed for sampling.

As discussed during the November 30, 2006 meeting, IEPA will provide a supplemental comment regarding additional wells it believes should be sampled consistent with the Phase II RI objectives. In addition, a determination of the then existing wells that should be included in *future monitoring* of plant site conditions will be made after completion of the Phase II RI and based on the combined results of the Phase I/II RI and the appropriate data requirements for proceeding with an FS.

b) *Questions regarding the HCOPC list again come into play. The Workplan proposes that only the Table 4-1 list of HCOPCs be included in the analytical parameter list for Phase II sampling. This may be an issue for several compounds like radium228, which exceeded the screening value in many samples from the UWBZ, TOLA and BOLA, but is not included on the list because it was dropped in the HCOPC refinement process (due to low relative-risk) The relative-risk concept is not accepted by the Illinois EPA.*

If the relative risk screening method is removed from the groundwater screening process, aluminum and phosphorus are the only compounds that require addition to the list of HCOPCs for the groundwater monitoring. The screening process in the Revised Phase I RI Report contained three steps: (1) comparison to background concentrations contained in the Tiered Approach to Corrective Action (TACO) regulations, (2) comparison to risk-based screening values, and (3) human health constituents of potential concern (HCOPC) refinement. Step 3, the HCOPC refinement, contained six criteria (i.e., frequency of detection, degree of exceedance, potential site relatedness, presence in other media, chemical specific factors, and relative risk screening).

The preliminary groundwater HCOPCs identified after the first two steps are listed on Table 1 for each of the three areas. The list was further refined by evaluating the first two criteria in the HCOPC refinement step: frequency of detection, and degree of exceedance (i.e., the magnitude that the maximum detected concentration was above the screening value). The frequency of detection and degree of exceedance were evaluated using the criteria identified in Section 5.3.1 of the Revised Phase I RI Report. If the frequency of detection was less than 10%, the parameter was not retained as an HCOPC. If the frequency of detection was greater than 10%, the maximum detected concentration was compared to the screening value. If the maximum detected concentration was less than an order of magnitude (i.e., 10 times) above the screening value, the parameter was not retained as an HCOPC as part of the degree of exceedance evaluation. The data used for the screening are listed on Table 1. As a result of the screening, aluminum will be added to the list of HCOPCs.

The HCOPCs that were identified as potentially site related in the Revised Phase I RI Report are arsenic, cadmium, lead, zinc, and phosphorus. The HCOPC list in the Phase II RI Work Plan included all of these except for phosphorus; therefore, phosphorus will be added to the list of HCOPCs.

The remaining criteria, presence in other media, chemical-specific factors, and relative risk screening were not used to further adjust the list of HCOPCs. Presence in other media was not used because the HCOPC list will only be used for groundwater monitoring. Chemical-specific factors were not used because no factors were identified in the Revised Phase I RI Report. The relative risk screening was not used in response to your comment.

As shown on Table 1, Radium 228 was screened out because the maximum detected concentration was less than one order of magnitude above the screening value (i.e., degree of

exceedence). Other compounds such as beryllium, mercury, selenium, and vanadium were also excluded using the degree of exceedence criteria.

c) *Suggested general locations for groundwater samples in addition to those proposed in the Workplan are shown on the attached figure. Data for these general areas may be obtained by installing new wells or sampling existing wells (some of which may be obtained if a full round of well samples is collected during the initial Phase II sample effort).*

Please see the response to your general comment on Section 5.0. The suggested locations in the attached figure were evaluated, and three appear to add to the investigation of the FPSA consistent with the Phase II RI objectives: (1) the movement of the westernmost B sample to the south property line, (2) the northernmost U/B samples located in the Lithopone Ridges Area, and (3) easternmost U/T/B samples located in the VPCDA near well W-22S. These three will be added to the Phase II RI Work Plan.

d) *It is difficult to tell from Figure 5-1, and absent as built drawings for the Force Main from the IWTP lift station, if the current plan adequately evaluates the high volume and apparent high concentration groundwater source known to exist along the south side of the Primary Zinc Slag Pile. As you will recall from conversations; during construction of the force main a high volume water source necessitated the relocation of the force main from an east west alignment along the slag pile south across the road then east. Borings and groundwater monitoring must be provided to evaluate this source area and the potential for that contaminated water to pass under Marquette St west of the IRM trenches and the current collection system.*

MW-37U was added to evaluate this potential high volume water source. If this well is not located in the correct position, please suggest an alternative location.

***Section 5.2.1 UWBZ Groundwater Investigation**: Permanent monitoring wells in the vicinity of E5 in the Acid Plant, C4 in the Lithopone Ridge area, and downgradient of C4 in the rail yard must be included in the work plan.*

Please see the response to your general comment on Section 5.0. Further investigations are therefore not needed to meet Phase II RI objectives in the areas around borings E5 or C4.

***Section 5.2.2 TOLA Groundwater Investigation**:*

a) *Should sample all existing TOLA wells again, except W22S in VPCDA (install new well at P4 here).*

Please see the responses to your general comments on Section 5.0 and 5.2. Sampling all existing TOLA wells is not necessary; however, as indicated in our response to your comment (c) for Section 5.2, a new TOLA well will be installed in the VPCDA.

b) *What are the construction details of HH08 and HH09?*

The construction details were presented in the boring logs attached to the June 19, 2001 "Supplemental Hydrogeologic Investigation" prepared by Daniel B. Stephens & Associates, Inc. The well construction logs for HH08 (originally H-8) and HH09 (originally H-9) are attached to this letter as Attachment 1, and were previously submitted in Appendix D of the Cumulative RI Site Wide Data Report. Monitoring well, HH08 was inadvertently abandoned

in 2003 and will be replaced with a similarly constructed TOLA well installed within 10 feet of the former location of HH08.

c) *Proposed well MW30T should be closer to boring C4 if possible.*

The proposed monitoring well MW-30T will be moved as close as possible to boring C4. The location of MW-30T may be constrained by the topography and unstable surface conditions of the Lithopone Ridges Area.

d) *A monitoring well upgradient of the VPCDA should be added.*

Please see the response to your general comment on Section 5.0. Existing monitoring well W4S and proposed monitoring well MW-34T are located upgradient of the VPCDA.

The Work plan discusses sulfate detected in J-3 at length and seems to suggest that the high concentration here may be an anomaly. However, it should be noted that concentrations above the screening value were detected in upgradient samples I-5 (546 mg/L), W15S (1420 mg/L), G-3 (1620 mg/L), G-4 (870 mg/L), and G-5 (1140 mg/L). These locations form an approximate line that extends from the Acid Plant to the front gate at J-3.

A monitoring well (i.e., MW-22T) is proposed for the J-3 location. The results from the monitoring well will be used to evaluate sulfate concentrations in the groundwater.

Section 5.2.3 BOLA Groundwater Investigation:

a) *All existing BOLA wells should be sampled again as part of initial Phase II sampling effort.*

Please see our response to your general comment on Section 5.2.

b) *See attached figure for suggested additional sample locations.*

Please see our response to your comment c) on Section 5.2.

Section 5.2.5 Evaluation of Groundwater Collection System/IRM Walls:

a) *There has been plenty of time to determine the existence of and to examine any as-built drawings for the IRM/interceptors. Why can't it be determined now if pits are needed and if so, their approximate locations?*

An investigation consisting of test pits and surveying to field verify the configuration of the IRM/interceptors will be conducted during the Phase II RI and the work plan will be modified accordingly. The work will start at locations likely to be within the lateral extent of the walls and proceed outward from those locations until the ends of the systems are located. The approximate test pit locations will be added to Figure 5-2 of the work plan. The DePue Group will consult with the IEPA during the test pit activities if these locations change based on the findings of the initial test pits.

b) *On the inset of Figure 5-2, the locations of wells relative to the positions of the IRM walls, interceptor trenches etc. do not match those shown on Figure 1-10B of the Phase I RI Report. We've been trying to get a correct Figure for this area since 2003.*

The locations of the wells, IRM walls, and interceptor trenches shown on Figure 5-2 are the correct locations based on current information. Configurations shown on earlier drawings

should be disregarded. The locations of the IRM walls will be surveyed as part of the Phase II RI field work, and a field verified location map will be prepared as part of the Phase II RI Report.

c) *Is there a need (or even a way?) to measure water levels in the interceptor trenches during the monitoring period?*

Based on our knowledge of the system construction details, there is no way to measure the water levels in the interceptor trenches during the monitoring period.

d) *If the DePue Group anticipates that geochemical activity in the area between the Slag Pile and the Lake may be relied upon in the FS or in the future as a significant potential remedy, then some of these temporary wells should be completed as permanent installation to confirm this conclusion and monitor fluctuations.*

TW-5U will be converted to a monitoring well, which will provide a complete transect of monitoring wells within and downgradient of the area of the highest concentrations in ground water beginning at the south-center of the slag pile.

e) *During the monitoring period, it is suggested that water levels in MW37U, W18S, HS10(S), PZ3S, PZ4S, and HS11(S) also be measured when the temporary wells are measured.*

Water levels will be measured in MW-37U, W18S, HS10(S), PZ3S, PZ4S, and HS11(S) during the monitoring period when the water levels in the temporary wells are measured.

***Section 5.2.6; Off-Site Groundwater Investigation; Page 5-9; Second Paragraph**: It is stated in the second paragraph on page 5-9 that if "significant impacts" are observed in wells adjacent to the property line, DePue Group will proceed to the second phase of the groundwater investigation. The Illinois EPA will require that "significant impacts" be defined. As an initial screen, any exceedance of a groundwater standard or criteria in wells located at the property boundary will trigger further and prompt investigation*

In the last paragraph of this section, in the first sentence, change "may" to "will". In the last sentence of the paragraph strike ", if conducted,".

As discussed during the November 30, 2006 meeting, after each quarterly sampling event, the validated groundwater data from all of the downgradient monitoring wells (i.e., W5S, PS-11, MW-22T, MW-22B, MW-23U, MW-23T, W17S, W17D, MW-24U, PZ4S, PZ4I, W18S, W18D, MW-27T, MW-29U, MW-29T, MW-29B, HS11(S), MW-28T, W19S, W19D, MW-36T, MW-26U, MW-26T, and MW-26B) will be tabulated, summarized, and presented to IEPA for discussion on the appropriate course of action for the off-site groundwater investigation.

***Sections 5.4.1 and 5.4.2 Geochemistry of Non-Native and Native Material**: Consider some of the geochemistry analysis for the Acid Plant area (boring E-5 area).*

Please see the response to your general comment on Section 5.0. As a result, we do not see the need to investigate further the area around boring E5.

***Section 5.4.3; SPLP/TCLP Samples; Page 5-13; First Paragraph**: It should be noted that the proposed revisions to TACO include pH-specific soil objectives for lead. The proposed values may be used to evaluate data for this site.*

The proposed pH-specific soil objectives for lead will be used to evaluate data in the Phase II RI Report.

***Section 5.5 Surface Water and Sediment Sampling**: Will seeps that occur above 450 amsl (along Municipal Dump, N003, N004, N005) be sampled during the Phase II or during the completion of the Lake investigation?*

The N003 and N004 seeps are proposed for sampling in the Phase II RI Work Plan. The N005 seep will be added to the sample list.

***General comments**:*

When does the DePue Group intend to evaluate soil and groundwater contamination possibly resulting from the historic discharge along the north side of the railroad track, south of Marquette St. This discharge is shown on several of the historic plan drawings flowing east to the box culvert under the railroad and into the South Ditch area. Likewise the former discharge from the Lithopone Plant area west to the stream and under the railroad track should be investigated at this time.

We assume you are referencing discharge from a pipe that crossed Marquette Street to the west of the current lift station and discharged into the railroad ditch that flowed eastward to the railroad culvert before the lift station, the new village water line, and associated storm water piping was installed. Those installations eliminated the portion of the railroad ditch west of the current lift station. The investigations already completed and those proposed for this Phase II RI adequately address this area.

I trust that the responses will provide a place to begin discussions during our meeting. Please contact us if you have any questions regarding this response.

Sincerely,

ENVIRON International Corporation

Mark A. Travers
Co-Project Coordinator

Angela E. DeDolph
Project Manager

Enclosures

cc: Connie Sullinger – Illinois Environmental Protection Agency
Kevin Philips – Ecology and Environment (2 copies)
Joe Abel – ExxonMobil Corporation
Jeff Groy – CBS Operations Inc.
Steve Walker – Terra Environmental Services

TABLE

TABLE 1

Review of HCOPC Refinement Screening for Groundwater [1]
DePue, Illinois

Area	Bluff Area						Former Plant Site Area						Upland Portion of the Southeast Area					
Media	Groundwater						Groundwater						Groundwater					
Screening Method	Frequency of Detection		Maximum Concentration	Minimum Screening Value	Degree of Exceedence	HCOPC Exclusion Rationale [2]	Frequency of Detection		Maximum Concentration	Minimum Screening Value	Degree of Exceedence	HCOPC Exclusion Rationale [2]	Frequency of Detection		Maximum Concentration	Minimum Screening Value	Degree of Exceedence	HCOPC Exclusion Rationale [2]
Screening Criteria		>10%			>10			>10%			>10			>10%			>10	
Preliminary Groundwater HCOPC																		
SVOCs (ug/L)																		
2-Methylnaphthalene																		
Benzo(a)anthracene							1/175	0.57%	89	0.13	684.62	(a)						
Benzo(a)pyrene							1/175	0.57%	94	0.2	470	(a)						
Benzo(b)fluoranthene							1/175	0.57%	97	0.2	485	(a)						
Benzo(k)fluoranthene							1/175	0.57%	90	0.17	529.41	(a)						
bis(2-Ethylhexyl)phthalate							4/58	6.9%	49	6	8.17	(a,b)						
Chrysene							1/175	0.57%	90	1.5	60	(a)						
Dibenz(a,h)anthracene							1/175	0.57%	99	0.3	330	(a)						
Indeno(1,2,3-cd)pyrene							1/175	0.57%	100	0.43	232.56	(a)						
Pesticides/Herbicides (ug/L)																		
Heptachlor epoxide							4/57	7.0%	0.23	0.2	1.15	(a,b)						
Total Inorganics (mg/L)																		
Aluminum							40/57	70%	105	3.5	30	HCOPC						
Arsenic	16/30	53%	0.19	0.01	19	HCOPC	53/177	30%	0.11	0.01	11	HCOPC	22/35	63%	0.039	0.01	3.9	(b)
Beryllium							69/177	39%	0.0259	0.004	6.5	(b)	7/35	20%	0.0083	0.004	2.075	(b)
Cadmium							123/177	69%	43	0.005	8600	HCOPC	17/35	49%	5.9	0.005	1180	HCOPC
Chromium							63/177	36%	0.13	0.1	1.3	(b)						
Cobalt							108/177	61%	14	1	14	HCOPC	22/35	63%	7.5	1	7.5	(b)
Copper							110/177	62%	339	0.65	522	HCOPC	12/35	34%	17	0.65	26.15	HCOPC
Iron	22/30	73%	5.9	5	1.18	(b)	108/177	61%	220	5	44	HCOPC	35/35	100%	342	5	68.40	HCOPC
Lead							64/177	36%	3.5	0.0075	467	HCOPC	8/35	23%	1.1	0.0075	146.67	HCOPC
Manganese	30/30	100%	4.3	0.15	28.67	HCOPC	171/177	97%	979	0.15	6527	HCOPC	35/35	100%	421	0.15	2806.67	HCOPC
Nickel							130/177	73%	16	0.1	160	HCOPC	21/35	60%	6.4	0.1	64	HCOPC
Selenium							57/177	32%	0.245	0.05	4.9	(b)	9/35	26%	0.14	0.05	2.82	(b)
Silver							24/177	14%	0.099	0.05	2	(b)						
Thallium							12/57	21%	0.3	0.002	150	HCOPC						
Vanadium							58/177	33%	0.167	0.049	3.4	(b)						
Zinc							165/177	93%	9950	5	1990	HCOPC	28/35	80%	4,650	5	930	HCOPC
Miscellaneous (mg/L)																		
Fluoride							140/174	80%	43	4	10.75	HCOPC	29/35	83%	8.7	4	2.175	(b)
Nitrate+Nitrite as N	21/30	70%	94	10	9.4	(b)	145/179	81%	82.2	10	8.22	(b)						
Nitrite as N	3/19	16%	1.95	1	1.95	(b)	4/96	4.2%	1.7	1	1.7	(a)						
Sulfate	30/30	100%	3600	400	9	(b)	176/176	100%	26,400	400	66	HCOPC	35/35	100%	11,200	400	28	HCOPC
Radionuclides (pCi/l)																		
Radium 228 Gamma							23/23	100%	13.5	5	2.7	(b)						

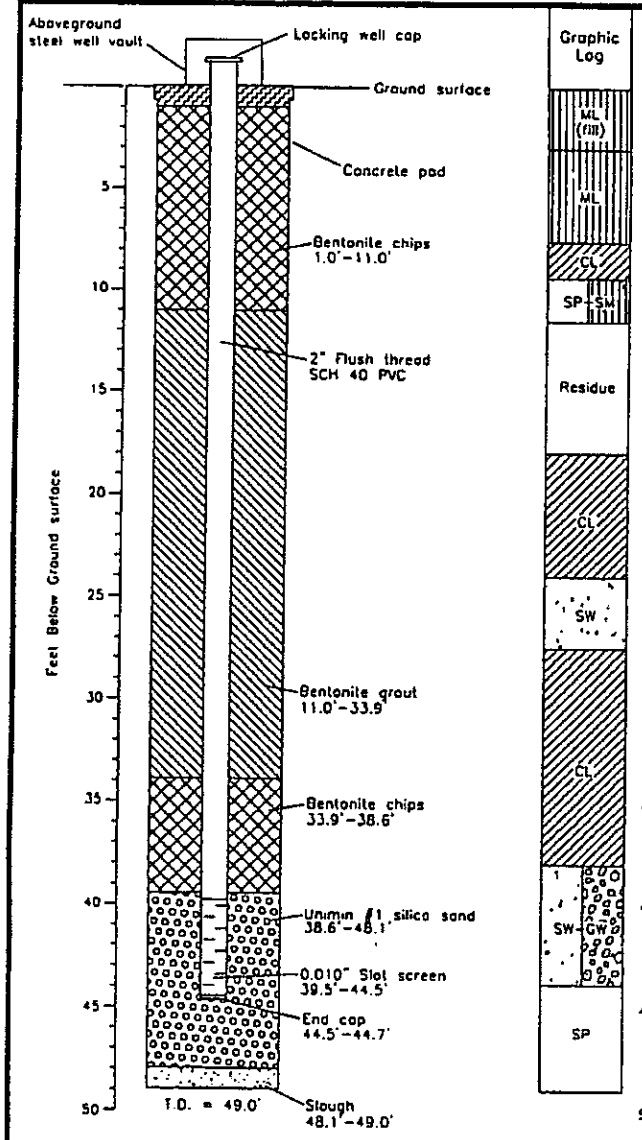
Key:
HCOPC = Human Health Constituent of Potential Concern

Notes:
Values shown in red in the frequency of detection columns are greater than 10%.
Values shown in red in the degree of exceedence columns are greater than 10 (i.e., one order of magnitude).
(1) Refined screening excluding the relative risk method
(2) Chemicals were not retained as HCOPCs based on the following rationale.
(a) Chemical was not retained as a HCOPC because its frequency of detection was less than 10%.
(b) Chemical was not retained as a HCOPC because the maximum detected concentration was less than an order of magnitude (i.e., 10 times) above the screening value.

ATTACHMENT 1

HH-08 and HH-09 Well Logs

T:\VDR\9334\93340IW.DWG (7 of 11)



Sample No.	Sample Interval (feet bgs)	Sample Recovery
H8-1 (9.0-11.6)	9.0-10.5	1.5/2.0
	10.5-12.5	2.0/2.0
H8-2 (19.0-22.9)	19.0-21.0	2.0/2.0
	21.0-22.9	1.9/1.9
H8-3 (29.0-29.9)	29.0-31.0	0.9/2.0

Comments and Lithology

0 - Olive brown (2.5Y 4/4); gravelly silt; mostly silt with minor fine gravel; low plasticity (fill)

3 - Very dark grayish brown (2.5Y 3/2); clayey silt with trace of sand; mostly silt with some to little clay and trace fine to coarse sand; low plasticity; moist

9 - Dark yellowish brown (10YR 4/4); silty clay; mostly silt with some clay and trace of fine sand; low to medium plasticity; soft; saturated

9.3 - Dark yellowish brown; sand to silty sand; fine to medium grained grading to fine to coarse; poor to well graded; loose to medium consistency; saturated

11.6 - Very dark gray (10YR 3/1); clay with minor silt; low plasticity; firm; moist (residue)

18 - Color change to olive brown (2.5Y 4/4); possibly becoming more sandy

19 - Light olive brown (2.5Y 5/4); sandy clay to clay; mostly clay with minor to some fine sand at 19 to 20 and 21.5 to 21.9 feet; low plasticity; soft; saturated

21 - Light olive brown (2.5Y 5/4); clay to sandy clay as above; mostly sandy clay at bottom, otherwise as above; saturated

24 - Olive brown (2.5 4/4); gravelly sand; mostly very fine to coarse sand with minor to some fine gravel to 1/2-inch diameter and trace clay; poorly-graded; saturated

27 - Increasing clay (clayey sand)

29 - Olive gray (5Y 4/2); clay with very thin layers of fine to medium sand; low plasticity; firm to stiff; damp to moist

35 - Olive gray clay, as above

38 - Sandy gravel to gravelly sand; approximately 50/50 fine to coarse sand with gravel to 1.5-inch diameter; saturated (unable to sample due to heaving)

44 - Dark grayish brown (10YR 4/2); sand; fine-grained; very poorly graded; loose to very loose; saturated

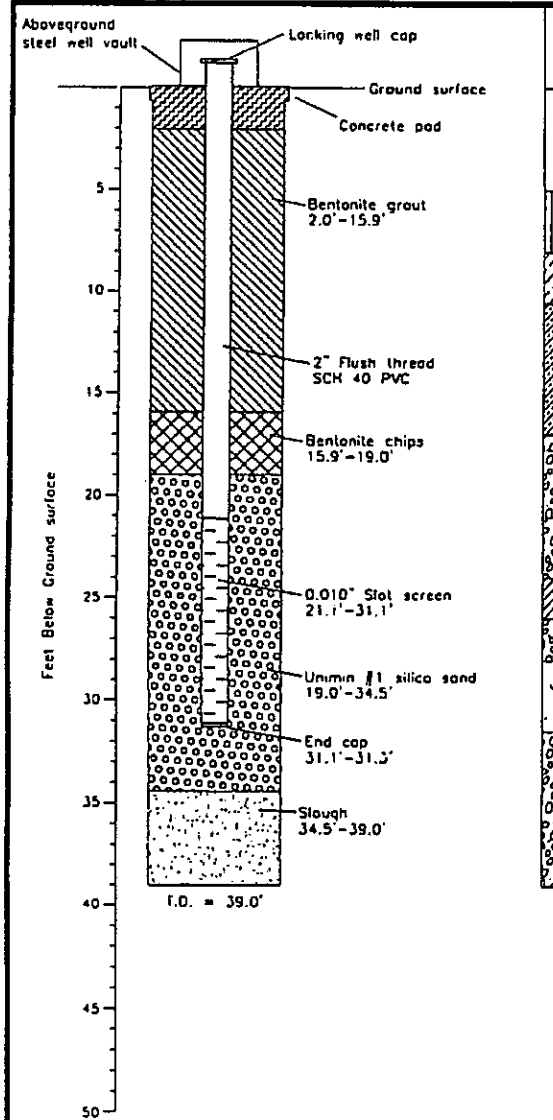
Geologist: B. Casadevall
Driller: Philip Environmental
Date completed: 9-13-99

Drilling method: Air rotary casing hammer
Bit diameter: 7 in. O.D.
Sample collection: Split-spoon; other descriptions based on drill cuttings

DEPUE SUPERFUND SITE
HORSEHEAD INDUSTRIES, INC.
Well Log: H-8

Daniel B. Stephens & Associates, Inc.
1-22-01
JN 9334

T:\VDR\9334\933401W.DWG (8 of 11)



Sample No.	Sample Interval (feet bgs)	Sample Recovery	Comments and Lithology
			0 – Black (10YR 2/1); residue; very fine to coarse sand and gravel-size; well-graded; dry; loose
			5 – Brown (10YR 5/3); clayey silt; low plasticity; mostly silt with some clay and trace of coarse sand (becomes more of sandy silt at 8 feet)
			8 – Black (10YR 2/1); organic silt with trace of fine sand; low plasticity
H9-1 (9.0-10.5)	9.0-11.0	1.4/2.0	9 – Black (10YR 2/1); organic clay with minor gravel at top; low plasticity; saturated; firm consistency
	10.4-11.2	0.8/2.0	10.5 – Dark gray (5Y 4/1); clay with minor fine sand; moderate plasticity; firm consistency; wet to saturated
			13 – Very dark grayish brown (10YR 3/2); sandy clay with trace gravel; moderate plasticity; firm to stiff consistency; mostly clay with some fine to coarse sand and trace of fine gravel
			17 – Possible top of sand and gravel
H9-2 (19.0-20.5)	19.0-21.0	1.5/2.0	19 – Light olive brown (2.5Y 5/3); sandy gravel; mostly fine gravel to 1.5-inch diameter with some fine to coarse sand; subrounded to subangular; medium consistency; saturated
			21 – Sandy gravel
			24 – Very dark grayish brown (10YR 3/2); sandy clay; mostly clay with some fine to medium sand and trace silt; low plasticity; saturated
			26 – Light olive brown (2.5Y 5/3); gravel and sandy gravel; mostly gravel to 2-inch diameter with little to some fine to coarse sand; well-graded; saturated
			28 – Grading to gravelly sand; gravel is finer
			32 – Cuttings are mostly gravel and sandy gravel; gravel is subangular to subrounded and up to 2 inches diameter with minor to some fine to coarse sand
			39 – Sandy gravel as above

Geologist: B. Casadevall
Driller: Philip Environmental
Date completed: 9-12-99

Drilling method: Air rotary casing hammer
Bit diameter: 7 in. O.D.
Sample collection: Split-spoon; other descriptions based on drill cuttings

DEPUE SUPERFUND SITE
HORSEHEAD INDUSTRIES, INC.
Well Log: H-9

Daniel B. Stephens & Associates, Inc.
1-22-01
JN 9334

963-8221 5.1 C

Supplemental Hydrogeologic Investigation DePue Superfund Site DePue, Illinois

Prepared for Horsehead Industries, Inc.
New York, New York

June 19, 2001

Daniel B. Stephens & Associates, Inc.
6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109

ENVIRON

May 23, 2007

Mr. Richard Lange
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

Re: Phase II Remedial Investigation Work Plan
Response to April 13, 2007 Comments
DePue Site, DePue, Illinois

Dear Mr. Lange:

ENVIRON International Corporation ("ENVIRON"), on behalf of the DePue Group, has prepared this response to the Illinois Environmental Protection Agency's (IEPA's) April 13, 2007 comments on ENVIRON's January 8, 2007 response to IEPA's October 20, 2006 comments on ENVIRON's August 2006 Work Plan for Phase II Remedial Investigation (the "Phase II RI Work Plan"). Selected IEPA comments are reproduced below in italic type with ENVIRON's response following indented and in regular type. The comments were transmitted in your April 13, 2007 email and further clarified in a meeting on May 8, 2007. One additional issue was identified at the May 8, 2007 meeting: a request that the number of soil samples collected in the former plant site area (FPSA) be evaluated to determine if sufficient soil samples have been collected to characterize the FPSA. This evaluation will be performed and submitted to you under separate cover approximately one week after the submittal of this letter.

Section 4.0 Data Gap Identification:

e) See our further comment under section 5.0 Phase II Field Programs; General Comment (below). (i.e., Determining the extent and mechanism of BOLA impacts and interaction between the TOLA and BOLA and potential discharge points should be an objective for the Phase II efforts).

Please see Section 5.0 responses below.

Section 5.0 Phase II Field Programs; General Comment

Currently the Illinois EPA is not confident that we will have an adequate understanding of the interior groundwater flow field during Phase II quarterly sampling events, especially for the Lower aquifer. Currently ENVIRON does not propose collecting samples at all existing wells, the Illinois EPA insists that water level data be collected at all existing and new wells in the UWBZ/TOLA/BOLA during each quarterly event.

The previous investigations and the proposed additional work in the Phase II RI Work Plan will provide sufficient understanding of the interior groundwater flow field. Based on the information presented in the Phase I RI Report, the general direction of groundwater flow in the UWBZ and the lower aquifer is towards the south. Vertical gradients between the UWBZ and the lower aquifer change from downward in the northern portions of the site near the Bluff Area to upward in the southern portions of the site. Section 7.6 of the May 2006 Phase I RI Report identifies data gaps. These data gaps do not include further definition of the interior groundwater flow field. Furthermore, installation of the additional monitoring wells proposed for the Phase II RI

will provide additional data to strengthen our understanding of the groundwater flow field at the Site.

Notwithstanding the above, the DePue Group will agree to the collection of a complete round of groundwater samples from accessible and useable wells located within the FPSA. Prior to performing sampling, the existing wells on the FPSA will be inspected to determine if they suitable for use. The inspection will be performed in accordance with the Standard Operating Procedure included in Appendix B of the October 2006 *Field Sampling Plan Addendum* prepared by ENVIRON. Following the inspection, all accessible and useable wells on the former plant site area will be sampled for the HCOPCs identified in the Phase II RI Work Plan. Once the results of the sampling are received, they will be reviewed and the monitoring well locations proposed in the Phase II RI Work Plan will be evaluated. If necessary, the locations of the new wells will be adjusted. The proposed monitoring well locations will be presented to IEPA for approval. Upon approval, the new monitoring wells will be installed and sampled for the HCOPCs identified in the Phase II RI Work Plan. The complete sampling of the existing wells and the initial sampling of the new wells will together be the first quarterly sampling event. After the results from the newly installed monitoring wells are received, the data from the existing and newly installed wills will be used to prepare the monitoring well network for the subsequent three rounds of quarterly sampling. The proposed monitoring well network will be presented to IEPA for approval. Upon approval of the monitoring well network, the remaining three rounds of the quarterly sampling will be performed in accordance with the procedures outlined in the Phase II RI Work Plan.

The Illinois EPA must point out that in the Acid/Fertilizer Plant area, we currently primarily have irreproducible temporary well data that now is 6 years old. There are no TOLA wells in this area, and the existing wells that are there, are located at the periphery and generally side-gradient of the former operations area.

We assume this comment is referencing IEPA's previous comment to install a nested set of UWBZ/TOLA/BOLA wells in the Acid/Fertilizer Plant area. The previous groundwater data collected in the Acid/Fertilizer Plant area identified groundwater impact. Therefore, the nature of groundwater impacts has been identified and the resulting data gap is defining the extent of the impact. The proposed sampling of existing monitoring wells and the installation and sampling of new monitoring wells at the downgradient edge of the FPSA adequately evaluates the extent of the impact.

The abandonment of TOLA and BOLA wells PS-9 and W21D (under the CAMU) without replacement is also potentially problematic. BOLA well W21D had a number of exceedances and elevated concentrations relative to "upgradient" BOLA wells. These two wells must be replaced with new wells located near the northwest corner of the CAMU and included in the quarterly sampling and water level measurements. Also, given the current uncertainty in the BOLA flow field, it is not certain that existing perimeter wells near W17D or W18D are positioned to detect whether BOLA constituents in W21D are migrating offsite. A BOLA well nested with the existing wells PZ4I and PZ4S is requested.

PZ1I (TOLA) is located within approximately 240 feet of PS-9 and will be used in the TOLA evaluation. W21D will not be replaced because the additional IEPA-requested BOLA well nested with PZ4S and PZ4I is located immediately downgradient of W21D. This BOLA well will be moved towards the south to minimize potential cross-contamination issues related to the slag pile area. The approximate location of the new

BOLA well is shown on Figure 1. In addition, four borings were advanced to characterize the geology of the CAMU area prior to the construction of the CAMU. The results of this investigation are presented in the December 2005 *CAMU Investigation Results Report*, which was included as Appendix A in the May 2006 Phase I RI Report.

During the May 8, 2007 meeting, this item was further clarified as a request that a groundwater monitoring plan for the CAMU be prepared. A plan will be proposed under separate cover. In reviewing the available monitoring wells in the vicinity of the CAMU, it appears that one additional well is needed for the monitoring of the CAMU. This well will be located to the northwest of the CAMU and will be installed in the Upper Water Bearing Zone (UWBZ).

Section 5.1.1 Aquitard Evaluation

See our further comment under section 5.0 Phase II Field Programs; General Comment (above). (i.e., Boring E5 in the Acid Plant area had significant UWBZ concentrations and there are significant TOLA concentrations downgradient of this point. An aquitard evaluation (with Shelby Tube) in this area either as a separate boring or in conjunction with installation of additional wells is requested)

Please refer to Section 5.0 responses above.

Section 5.1.2 UWBZ Evaluation

b.) The review of historical drawings should take place now so that preliminary maps can be generated and test pits located for inclusion in the Phase II Work Plan. A major purpose for identifying these trenches was to evaluate the possibility of preferential pathways for UWBZ groundwater, an RI groundwater flow and transport mechanism determination, not just to evaluate impacts on remedies proposed during the FS. An appropriate number of soil and water grab samples should be budgeted to support assessment of potential impacts from these past utility trenches.

The DePue Group is reviewing historical drawings with regard to utility trenches. Test pits are proposed parallel to the property line +/- 10-feet from the estimated location of utility trenches as shown in Figure 1. The DePue Group will notify the IEPA if additional trenches are identified during their review of the historical drawings. The decision to collect groundwater and soil samples will be made in consultation with the IEPA on a pit by pit basis. All grab groundwater samples will be filtered prior to analysis to avoid issues with suspended sediment resulting from the excavating effort.

Section 5.2 Groundwater Investigation, General Comments

a) See our further comment under Section 5.0 Phase II Field Programs; General Comment (above). (i.e., Since it will be more than six years since comprehensive water quality sampling has been performed, it is strongly recommended that after installation of Phase II wells, all existing UWBZ, TOLA, and BOLA wells be sampled, not just a select few as proposed in the Workplan. For subsequent quarterly sampling a reduced list of wells could be considered by the Agency following review of the 1st round data set.)

Please refer to Section 5.0 responses above.

d) MW-37U along with the test pit activity discussed in 5.1.2 b above will adequately address this comment. The specific location of MW-37U (likely +/- 100 ft of the location shown) will be made in the field by consensus of the IEPA and DePue Group representatives.

Field consensus is acceptable.

Section 5.2.2 TOLA Groundwater Investigation

See our further comment under Section 5.0 Phase II Field Programs; General Comment (above). [i.e., Should sample all existing TOLA wells again, except W22S in VPCDA (install new well at P4 here)].

Please refer to Section 5.0 responses above.

Section 5.2.3 BOLA Groundwater Investigation

See our further comment under Section 5.0 Phase II Field Programs; General Comment (above). (i.e., All existing BOLA wells should be sampled again as part of initial Phase II sampling effort.)

Please refer to Section 5.0 responses above.

Section 5.5 Surface Water and Sediment Sampling

Addition of seep N005 to the Phase II sampling is acceptable. Are we to assume from this response that seeps along the base of the municipal dump will be sampled during the next phase of Lake investigation?

The DePue Group is unaware of any additional seeps along the base of the municipal dump. If significant seeps are observed during the Phase II RI work, the seeps will be surveyed and the decision to sample the seeps will be made in consultation with the IEPA. If the seep elevation is measured to be below 450 feet above mean sea level, the seep will be addressed as part of the Lake RI, otherwise, the seep will be sampled as part of the Former Plant Site Area Phase II RI.

General Comments

Relating to the "historic discharge along the north side of the railroad track...." The Illinois EPA request that a minimum of two (2) – five (5) ft soil borings be included between the toe of the Water Main berm and the toe of the Railroad berm west of the Division St. drain road crossing and the IWTP Lift Station.

The DePue Group agrees to excavate two test pits in this area. The general location for the test pits is shown on Figure 1. The decision to collect soil samples and the selection of exact sample locations will be made in the field by consensus of the IEPA and DePue Group representatives. If soil samples are collected, they will be collected from the distinct soil horizons encountered and analyzed for HCOPCs.

The response is silent on the historic discharge from the Lithopone plant. As has recently been discussed this historic discharge exited plant site near the south west corner of the site, crossed the current Rail Road street (Marquette west from the south gate) and proceeded west down the north side of the railroad track. The discharge entered the "tunnel stream" immediately prior to

it's flowing under the railroad track. The Lake RI will address any residual contamination of the stream- bed but past sediment and soil contamination in the now filled ditch must be the subject of assessment. Five (5) five (5) ft soil borings near the north toe of the railroad berm west from the fire station to the "tunnel stream" should adequately address this concern.

> The DePue Group agrees to excavate five test pits in this area. The general location for the test pits is shown on Figure 1. The decision to collect soil samples and the selection of exact sample locations will be made in the field by consensus of the IEPA and DePue Group representatives. If soil samples are collected, they will be collected from the distinct soil horizons encountered and analyzed for HCOPCs.

I trust that these responses provide sufficient information for work to proceed. Please contact us if you have any questions regarding this response.

Sincerely,

ENVIRON International Corporation

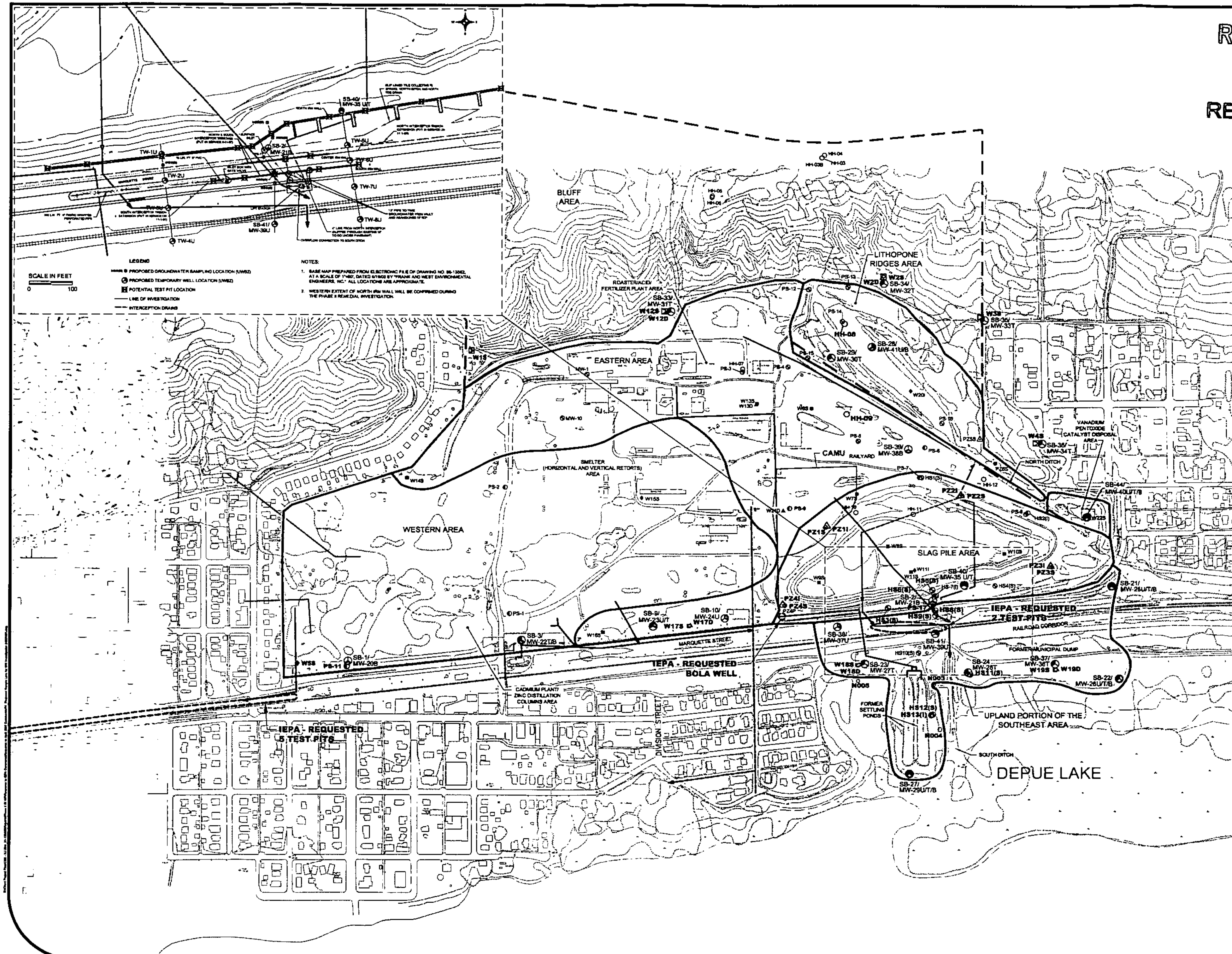
Mark A. Travers
Co-Project Coordinator

Angela E. DeDolph
Project Manager

Enclosures

cc: Kevin Philips – Ecology and Environment (2 copies)
Joe Abel – ExxonMobil Corporation
Jeff Groy – CBS Operations Inc.
Steve Walker – Terra Environmental Services

FIGURE



RELEASABLE

OCT 22 2007

REVIEWER MD

LEGEND:

APPROXIMATE AREA OF FORMER PLANT SITE AND UPLAND PORTION OF THE SOUTHEAST AREA

APPROXIMATE AREA OF BLUFF AREA

HISTORICAL FEATURE

PHASE I RI SAMPLING LOCATIONS:

- W2D ▲ MONITORING WELL (BASE OF LOWER AQUIFER)
- W5S ◆ MONITORING WELL (TOP OF LOWER AQUIFER)
- W11S ■ MONITORING WELL (UWBZ OR AQUITARD)
- W3S MONITORING WELL (BLUFF UNDIFFERENTIATED)
- PZ4S ● PIEZOMETER (UWBZ OR AQUITARD)
- PZ4I △ PIEZOMETER (TOP OF LOWER AQUIFER)

OTHER LOCATIONS

- PS-11 EXISTING MONITORING WELL OR PIEZOMETER (TOP OF LOWER AQUIFER)
- HS11(S) EXISTING MONITORING WELL OR PIEZOMETER (UWBZ OR AQUITARD)
- HH-03 ○ HHI/DANIEL B. STEPHENS TEMPORARY AND PERMANENT MONITORING WELL
- PROPOSED PHASE II RI MONITORING WELL (UWBZ)
- PROPOSED GROUNDWATER AND SEEP SAMPLING LOCATION (UWBZ)
- PROPOSED PHASE II RI MONITORING WELL (TOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (TOLA)
- PROPOSED PHASE II RI MONITORING WELL (BOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BLUFF UNDIFFERENTIATED)

UWBZ = UPPER WATER-BEARING ZONE

TOLA = TOP OF LOWER AQUIFER

BOLA = BASE OF LOWER AQUIFER

CAMU = CORRECTIVE ACTION MANAGEMENT UNIT

ABANDONED MONITORING WELL OR PIEZOMETER

UTILITIES

- 1904: OPEN DITCH
- 1907: 2.5-INCH WATER, 3-INCH SEWER
- 1907: 36-INCH SEWER, 24-INCH SUCTION, 4-INCH WATER
- 1912: 18-INCH STORM SEWER
- 1916: SEWER
- 1916: 6-INCH VIT. DRAIN
- PRE-1920: 36-INCH DRAIN AND OPEN DITCH
- 1920: 18-INCH TILE
- 1920: 36-INCH STORM
- 24-INCH TILE
- 1958: WATER LINES
- 1966: 48-INCH RCP
- 6-INCH WATER LINES

NOTES:

1. BASE MAP FROM FIGURE 1 OF PHASE 1 SITE-WIDE REMEDIAL INVESTIGATION DATA REPORT, ADDENDUM 1 DATED JANUARY 30, 2001 AT A SCALE OF 1" = 400', PROVIDED BY GOLDER ASSOCIATES.
2. ALL LOCATIONS ARE APPROXIMATE.
3. THE FOLLOWING UWBZ WELLS WILL BE SAMPLED AS PART OF THE EVALUATION OF THE IRM WALLS AND INTERCEPTION TRENCHES: HS3, HS5, HS6, HS8, HS8, PS-17.
4. TWO ADDITIONAL UWBZ WELLS MAY BE INSTALLED ALONG THE NORTHERN PERIMETER OF FPSA, IF EXISTING WELLS CANNOT BE USED AS BACKGROUND WELLS.

0 240 480
SCALE IN FEET

ENVIRON

PROPOSED SAMPLE LOCATIONS FOR GROUNDWATER INVESTIGATION

PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE	CONTRACT NUMBER		FIGURE
05/21/07	21-12046E2		1
DRAFTER: APR	APPROVED:	REVISED:	

ENVIRON

June 19, 2007

Mr. Richard Lange
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

Re: Phase II Remedial Investigation Work Plan
Updated Screening of HCOPCs for Groundwater Sampling
DePue Site, DePue, Illinois

Dear Mr. Lange:

ENVIRON International Corporation ("ENVIRON"), on behalf of the DePue Group, has prepared this letter to further update the screening of the human-health constituents of potential concern (HCOPCs) for the DePue Site in DePue, Illinois (the "Site"). The Illinois Environmental Protection Agency's (IEPA's) concerns with the previous screening were initially transmitted in an October 20, 2006 comment letter on ENVIRON's August 2006 Work Plan for Phase II Remedial Investigation (the "Phase II RI Work Plan"). ENVIRON provided a response to those comments in a January 8, 2007 response to comments letter. Subsequently, the IEPA's concerns were further clarified in a meeting on June 8, 2007. The sections below outline the further updates to the screening process that were performed in response to the concerns raised at the meeting. The HCOPCs that are proposed in this letter will be used as the sampling parameters for the upcoming quarterly groundwater sampling events proposed for the Site. The HCOPCs that will be used for the human health and ecological risk assessments will be evaluated as part of the risk assessment process.

Background

The initial list of HCOPCs proposed in the Phase II RI Work Plan were based on a screening process outlined in ENVIRON's May 2006 *Revised Phase I Remedial Investigation Report* (the "Revised Phase I RI Report"). This process used a screening step based on relative risk. Based on IEPA's October 20, 2006 comment letter, a new screening process was proposed in ENVIRON's January 8, 2007 response to comments letter that did not contain the relative risk screening step. This updated screening process contained four steps: (1) site relatedness, (2) comparison to background concentrations contained in the Tiered Approach to Corrective Action (TACO) regulations, (3) comparison to risk-based screening values, and (4) HCOPC refinement.

The HCOPCs that were identified as potentially site related in the Revised Phase I RI Report are arsenic, cadmium, lead, zinc, and phosphorus. These parameters are automatically included on the HCOPC list.

The remaining detected parameters were then compared to TACO background concentrations and risk-based screening values. The preliminary groundwater HCOPCs identified after these two steps were listed, and the list was further refined by evaluating two HCOPC refinement criteria: frequency of detection, and degree of exceedance (i.e., the magnitude that the maximum detected concentration was above the screening value). If the frequency of detection was less than 10%, or if the maximum detected concentration was less than an order of magnitude (i.e., 10 times) above the screening value, the parameter was not retained as an HCOPC.

Updated HCOPC Screening

Based on the discussions during the June 8, 2007 meeting, ENVIRON understands that you were concerned with the use of 10% as the frequency of detection threshold and with the use of one rather than both of the refinement criteria to remove a parameter from the HCOPC list. ENVIRON has updated the HCOPC screening such that a 5% threshold was used for the frequency of detection and a parameter had to be below both the frequency of detection and degree of exceedance thresholds to be removed from the HCOPC list. The updated screening is shown on the attached Table 1.

If this updated screening is used, seven polynuclear aromatics (PNAs) [i.e., benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene], one semivolatile organic compound (SVOC) [i.e., bis(2-ethylhexyl)phthalate], one pesticide [i.e., heptachlor epoxide], 3 metals [i.e., beryllium, selenium, and vanadium], 2 inorganic parameters [i.e., nitrate+nitrite as N and nitrite as N], and one radionuclide [i.e., Radium 228]are added and one metal (i.e., barium) is removed from the previous list.

The updated list was further evaluated to determine if the distribution of the parameter warranted further groundwater sampling. With this step, the seven PNAs, the one SVOC, and the one pesticide were eliminated. The justification for the removal of each of these is as follows:

- Seven PNAs. The seven PNAs were detected during one sampling event at one location with a frequency of detection of 0.57%. Because of the very low frequency of detection, the distribution of the PNAs was evaluated to determine if the PNA concentrations are bounded by wells in which PNAs were not detected. The PNA bounding wells are highlighted on Figure 1, and the data from these wells is shown on Table 2. The single detection of the PNAs occurred during the December 2000 sampling event; therefore, the concentrations in the bounding wells for the December 2000 sampling event are shown on Table 2. Because PNAs were not detected in any of the bounding wells, these PNAs have been removed from the HCOPC list for the groundwater sampling.

- bis(2-Ethylhexyl)phthalate. The SVOC, bis(2-ethylhexyl)phthalate, was detected above the risk-based screening value in two wells (i.e., during the December 1999 sampling event in monitoring well PS-02 and during the August 2000 sampling event in monitoring well PS-03). Phthalates below 100 µg/L are considered common laboratory contaminants.[1] Because of the very low frequency of detection and the likelihood that the concentration of bis(2-ethylhexyl)phthalate is a laboratory artifact, the distribution of bis(2-ethylhexyl)phthalate was evaluated to determine if the bis(2-ethylhexyl)phthalate concentrations are bounded by wells in which bis(2-ethylhexyl)phthalate was not detected. The two monitoring wells were evaluated separately.

  In PS-02, the bis(2-ethylhexyl)phthalate concentration was above the risk-based screening value during the December 1999 sampling event, but was below the detection limit in the three subsequent sampling events as shown on Table 2; therefore, the concentrations are bounded in PS-02 by subsequent sampling events. In addition, the concentration is bounded by downgradient wells, which are highlighted on Figure 2.

[1] United States Environmental Protection Agency Office of Emergency and Remedial Response. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*. OSWER 9240.1-05A-P. October 1999. p 77.

In PS-03, the bis(2-ethylhexyl)phthalate concentration was above the risk-based screening value during the August 2000 sampling event, and the concentration had decreased to the risk-based screening value during the subsequent sampling event in December 2000 as shown on Table 2; therefore, the concentrations are bounded in PS-02 by the subsequent sampling event. In addition, the concentration is bounded by downgradient wells, which are highlighted on Figure 3.

Because of the above, bis(2-ethylhexyl)phthalatehas been removed from the HCOPC list for groundwater sampling

- Heptachlor epoxide. The pesticide, heptachlor epoxide was detected above the risk-based screening value in one well, W8S during the December 1999 sampling event. Because of the very low frequency of detection, the distribution of heptachlor epoxide was evaluated to determine if the heptachlor epoxide concentration is bounded by wells in which heptachlor epoxide was not detected. In W8S, the heptachlor epoxide concentration was above the risk-based screening value during the December 1999 sampling event, but was below the detection limit in the three subsequent sampling events as shown on Table 2; therefore, the concentrations are bounded in W8S by subsequent sampling events. In addition, the concentration is bounded by wells, which are highlighted on Figure 4. Because heptachlor epoxide was not detected in subsequent sampling events or any of the bounding wells, heptachlor epoxide has been removed from the HCOPC list for the groundwater sampling.

Conclusions

Based on the update screening presented in the section above, a new list of the HCOPCs that will be used for the upcoming groundwater sampling has been prepared as shown on Table 3.

I trust that the above evaluation provide sufficient information for work to proceed. Please contact us if you have any questions regarding this response.

Sincerely,

ENVIRON International Corporation

Mark A. Travers
Co-Project Coordinator

Angela E. DeDolph
Project Manager

Enclosures

cc: Kevin Philips – Ecology and Environment (2 copies)
Joe Abel – ExxonMobil Corporation
Jeff Groy – CBS Operations Inc.
Steve Walker – Terra Environmental Services

TABLES

TABLE 1

Review of HCOPC Refinement Screening for Groundwater [1]
DePue, Illinois

Area	Bluff Area						Former Plant Site Area						Upland Portion of the Southeast Area					
Media	Groundwater						Groundwater						Groundwater					
Screening Method	Frequency of Detection		Maximum Concentration	Minimum Screening Value	Degree of Exceedence	HCOPC Exclusion Rationale [2]	Frequency of Detection		Maximum Concentration	Minimum Screening Value	Degree of Exceedence	HCOPC Exclusion Rationale [2]	Frequency of Detection		Maximum Concentration	Minimum Screening Value	Degree of Exceedence	HCOPC Exclusion Rationale [2]
Screening Criteria		>5%			>10			>5%			>10			>5%			>10	
Preliminary Groundwater HCOPC																		
SVOCs (ug/L)																		
Benzo(a)anthracene							1/175	0.57%	89	0.13	685	HCOPC						
Benzo(a)pyrene							1/175	0.57%	94	0.2	470	HCOPC						
Benzo(b)fluoranthene							1/175	0.57%	97	0.2	485	HCOPC						
Benzo(k)fluoranthene							1/175	0.57%	90	0.17	529	HCOPC						
bis(2-Ethylhexyl)phthalate							4/58	6.9%	49	6	8.2	HCOPC						
Chrysene							1/175	0.57%	90	1.5	60	HCOPC						
Dibenz(a,h)anthracene							1/175	0.57%	99	0.3	330	HCOPC						
Indeno(1,2,3-cd)pyrene							1/175	0.57%	100	0.43	233	HCOPC						
Pesticides/Herbicides (ug/L)																		
Heptachlor epoxide							4/57	7.0%	0.23	0.2	1.15	HCOPC						
Total Inorganics (mg/L)																		
Aluminum							40/57	70%	105	3.5	30	HCOPC						
Arsenic	16/30	53%	0.19	0.01	19	HCOPC	53/177	30%	0.11	0.01	11	HCOPC	22/35	63%	0.039	0.01	3.9	HCOPC
Beryllium							69/177	39%	0.0259	0.004	6.5	HCOPC	7/35	20%	0.0083	0.004	2.08	HCOPC
Cadmium							123/177	69%	43	0.005	8,600	HCOPC	17/35	49%	5.9	0.005	1,180	HCOPC
Chromium							63/177	36%	0.13	0.1	1.3	HCOPC						
Cobalt							108/177	61%	14	1	14	HCOPC	22/35	63%	7.5	1	7.5	HCOPC
Copper							110/177	62%	339	0.65	522	HCOPC	12/35	34%	17	0.65	26	HCOPC
Iron	22/30	73%	5.9	5	1.18	HCOPC	108/177	61%	220	5	44	HCOPC	35/35	100%	342	5	68	HCOPC
Lead							64/177	36%	3.5	0.0075	467	HCOPC	8/35	23%	1.1	0.0075	147	HCOPC
Manganese	30/30	100%	4.3	0.15	29	HCOPC	171/177	97%	979	0.15	6,527	HCOPC	35/35	100%	421	0.15	2,807	HCOPC
Nickel							130/177	73%	16	0.1	160	HCOPC	21/35	60%	6.4	0.1	64	HCOPC
Selenium							57/177	32%	0.245	0.05	4.9	HCOPC	9/35	26%	0.14	0.05	2.82	HCOPC
Silver							24/177	14%	0.099	0.05	2	HCOPC						
Thallium							12/57	21%	0.3	0.002	150	HCOPC						
Vanadium							58/177	33%	0.167	0.049	3.4	HCOPC						
Zinc							165/177	93%	9950	5	1,990	HCOPC	28/35	80%	4,650	5	930	HCOPC
Miscellaneous (mg/L)																		
Fluoride							140/174	80%	43	4	10.8	HCOPC	29/35	83%	8.7	4	2.18	HCOPC
Nitrate+Nitrite as N	21/30	70%	94	10	9.4	HCOPC	145/179	81%	82.2	10	8.2	HCOPC						
Nitrite as N	3/19	16%	1.95	1	1.95	HCOPC	4/96	4.2%	1.7	1	1.7	(a)						
Sulfate	30/30	100%	3600	400	9	HCOPC	176/176	100%	26,400	400	66	HCOPC	35/35	100%	11,200	400	28	HCOPC
Radionuclides (pCi/l)																		
Radium 228 Gamma							23/23	100%	13.5	5	2.7	HCOPC						

Key:
HCOPC = Human Health Constituent of Potential Concern

Notes:
Values shown in red in the frequency of detection columns are greater than 5%.
Values shown in red in the degree of exceedence columns are greater than 10 (i.e., one order of magnitude).
(1) Refined screening excluding the relative risk method.
(2) Chemicals were not retained as HCOPCs based on the following rationale:
(a) Chemical was not retained as a HCOPC because its frequency of detection was less than 5% and the maximum detected concentration was less than an order of magnitude (i.e., 10 times) above the screening value.

TABLE 2

Summary of Data in Bounding Wells
DePue Site
DePue, Illinois

	PS-08 12/7/00 (ug/L)	HS2(I) 12/1/00 (ug/L)	W22S 12/1/00 (ug/L)	W10S 12/18/00 (ug/L)	HS1(S) 11/30/00 (ug/L)	W4S 12/8/00 (ug/L)
Benzo(a)anthracene	89	1 U	10 U	10 U	1 U	1 U
Benzo(a)pyrene	94	1 U	10 U	10 U	1 U	1 U
Benzo(b)fluoranthene	97	1 U	10 U	10 U	1 U	1 U
Benzo(k)fluoranthene	90	1 U	10 U	10 U	1 U	1 U
Chrysene	90	1 U	10 U	10 U	1 U	1 U
Dibenz(a,h)anthracene	99	1 U	10 U	10 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	100	1 U	10 U	10 U	1 U	1 U

	PS-02 12/21/99 (ug/L)	PS-02 5/22/00 (ug/L)	PS-02 8/16/00 (ug/L)	PS-02 11/28/00 (ug/L)	W5S 1/11/00 (ug/L)	W16S 12/20/99 (ug/L)	W15S 6/1/00 (ug/L)
bis(2-Ethylhexyl)phthalate	49	10 U	10 U	10 U	10 U	11 U	11 U

	PS-03 8/14/00 (ug/L)	PS-03 12/4/00 (ug/L)	W6S 8/11/00 (ug/L)	W13S 11/28/00 (ug/L)	W15S 1/11/00 (ug/L)
bis(2-Ethylhexyl)phthalate	13	6 J	11 U	10 U	10 U

	W8S 12/16/99 (ug/L)	W8S 5/10/00 (ug/L)	W8S 8/2/00 (ug/L)	W8S 12/18/00 (ug/L)	W6S 12/20/99 (ug/L)	W9S 12/14/99 (ug/L)	W10S 12/20/99 (ug/L)	W18S 12/14/99 (ug/L)	W19S 12/9/99 (ug/L)
Heptachlor epoxide	0.23	0.054 U	0.052 U	0.051 U	0.049 U	0.053 U	0.051 U	0.052 U	0.052 U

TABLE 3

Updated List of HCOPCs To Be Used
for Quarterly Groundwater Monitoring
DePue Site
DePue, Illinois

Total Inorganics (mg/L)

Aluminum
Arsenic
Beryllium
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Manganese
Nickel
Selenium
Silver
Thallium
Vanadium
Zinc

Miscellaneous

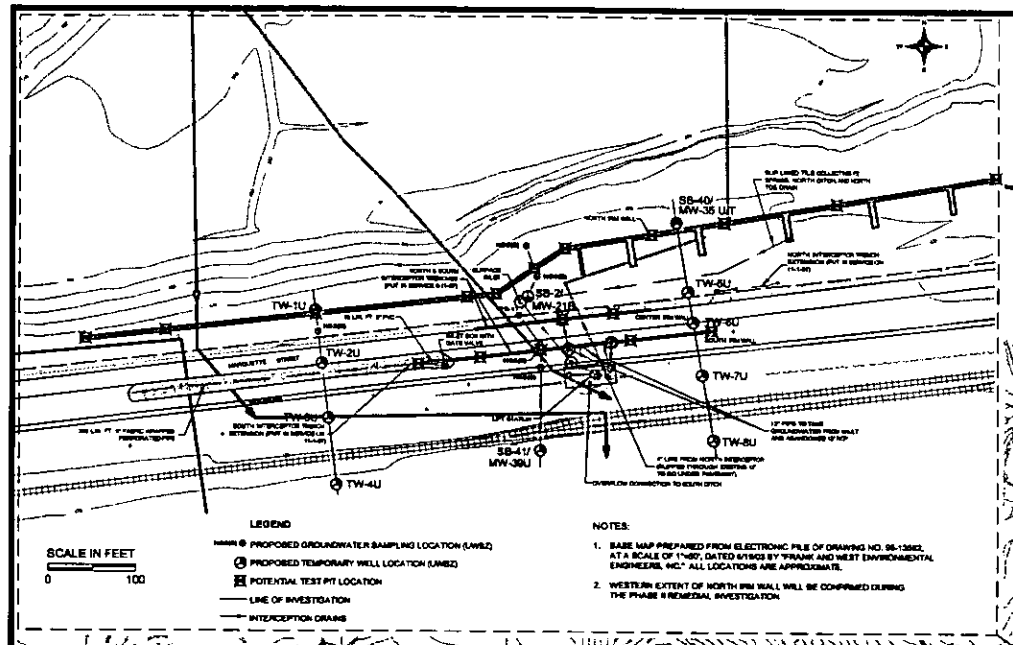
Fluoride
Nitrate+Nitrite as N
Nitrite as N
Phosphorus
Sulfate

Radionuclides

Radium 228 Gamma

HCOPC = Human Health Constituent of Potential Concern

FIGURES



LEGEND

- FORMER PLANT SITE AND UPLAND PORTION OF THE SOUTHEAST AREA
- APPROXIMATE AREA OF BLUFF AREA
- HISTORICAL FEATURE

PHASE I RI SAMPLING LOCATIONS:

- W2D ▲ MONITORING WELL (BASE OF LOWER AQUIFER)
- W5S ◆ MONITORING WELL (TOP OF LOWER AQUIFER)
- W11S ■ MONITORING WELL (UWBZ OR AQUITARD)
- W3S ⊠ MONITORING WELL (BLUFF UNDIFFERENTIATED)
- PZ4S ● PIEZOMETER (UWBZ OR AQUITARD)
- PZ4I △ PIEZOMETER (TOP OF LOWER AQUIFER)

OTHER LOCATIONS

- PS-11 ◐ EXISTING MONITORING WELL OR PIEZOMETER (TOP OF LOWER AQUIFER)
- HS11(S) ◍ EXISTING MONITORING WELL OR PIEZOMETER (UWBZ OR AQUITARD)
- HH-03 ○ HH/DANIEL B. STEPHENS TEMPORARY AND PERMANENT MONITORING WELL
- PROPOSED PHASE II RI MONITORING WELL (UWBZ)
- PROPOSED GROUNDWATER AND SEEP SAMPLING LOCATION (UWBZ)
- PROPOSED PHASE II RI MONITORING WELL (TOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (TOLA)
- PROPOSED PHASE II RI MONITORING WELL (BOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BLUFF UNDIFFERENTIATED)

UWBZ = UPPER WATER-BEARING ZONE
TOLA = TOP OF LOWER AQUIFER
BOLA = BASE OF LOWER AQUIFER
CAMU = CORRECTIVE ACTION MANAGEMENT UNIT
PNA = POLYNUCLEAR AROMATICS

- ABANDONED MONITORING WELL OR PIEZOMETER
- WELL WITH PNA CONCENTRATIONS ABOVE RISK-BASED SCREENING VALUES
- BOUNDING WELL

UTILITIES

- 1904: OPEN DITCH
- 1907: 2.5-INCH WATER, 3-INCH SEWER
- 1907: 36-INCH SEWER, 24-INCH SUCTION, 4-INCH WATER
- 1912: 18-INCH STORM SEWER
- 1916: SEWER
- 1918: 8-INCH VIT. DRAIN
- PRE-1920: 36-INCH DRAIN AND OPEN DITCH
- 1920: 18-INCH TILE
- 1920: 36-INCH STORM
- 24-INCH TILE
- 1958: WATER LINES
- 1986: 48-INCH RCP
- 8-INCH WATER LINES

NOTES:

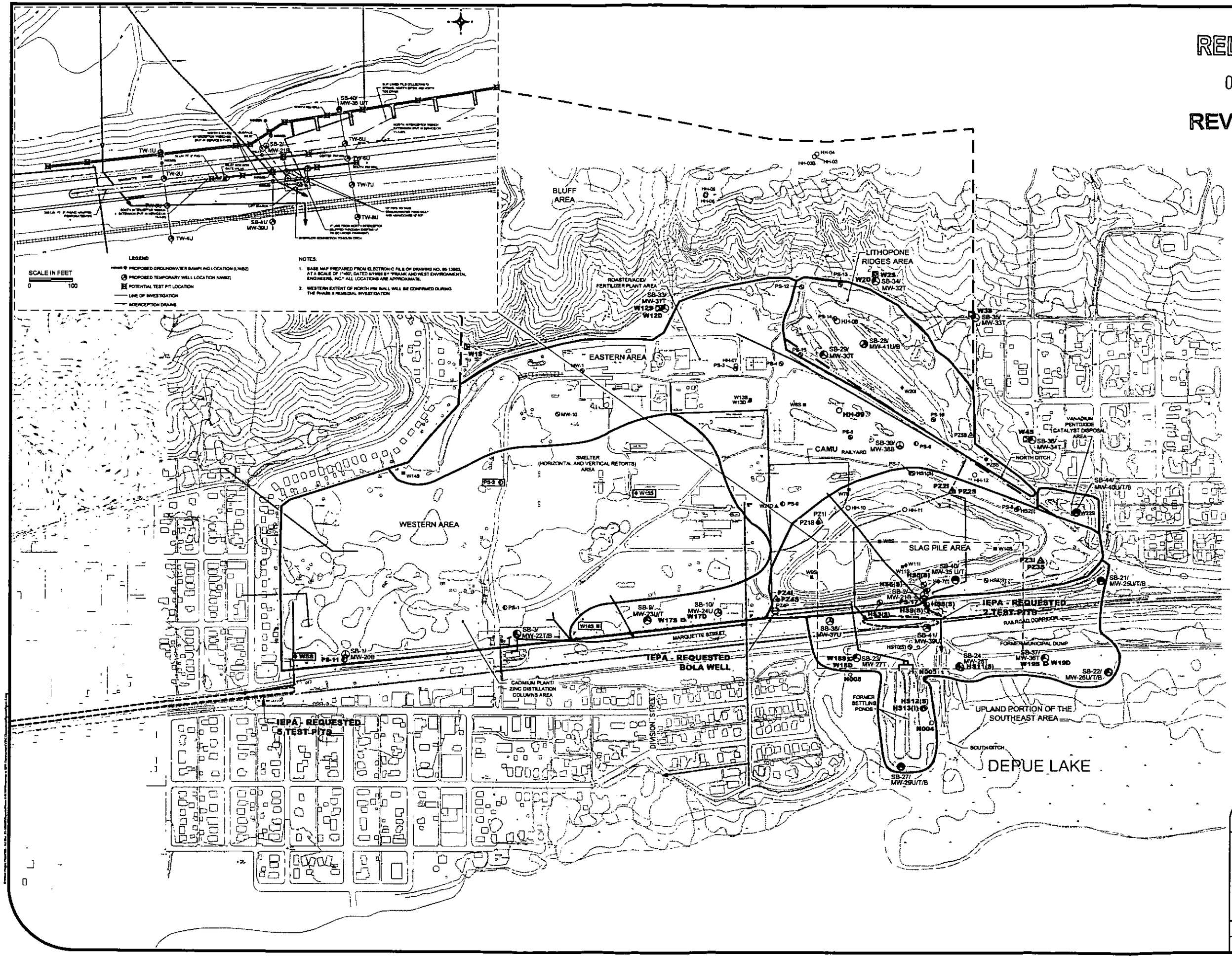
1. BASE MAP FROM FIGURE 1 OF PHASE I SITE-WIDE REMEDIAL INVESTIGATION DATA REPORT, ADDENDUM 1 DATED JANUARY 30, 2001 AT A SCALE OF 1" = 400', PROVIDED BY GOLDER ASSOCIATES.
2. ALL LOCATIONS ARE APPROXIMATE.
3. THE FOLLOWING UWBZ WELLS WILL BE SAMPLED AS PART OF THE EVALUATION OF THE IRM WALLS AND INTERCEPTION TRENCHES: HS3, HS5, HS6, HS8, HS9, PS-17.
4. TWO ADDITIONAL UWBZ WELLS MAY BE INSTALLED ALONG THE NORTHERN PERIMETER OF FPSA, IF EXISTING WELLS CANNOT BE USED AS BACKGROUND WELLS.

0 240 480
SCALE IN FEET

ENVIRON

BOUNDING OF PNA CONCENTRATIONS ABOVE RISK-BASED SCREENING VALUES AT PS-8
PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE	CONTRACT NUMBER		FIGURE
06/14/07	21-12046E2		1
DRAWN/BY: APR	APPROVED:	REVISED:	

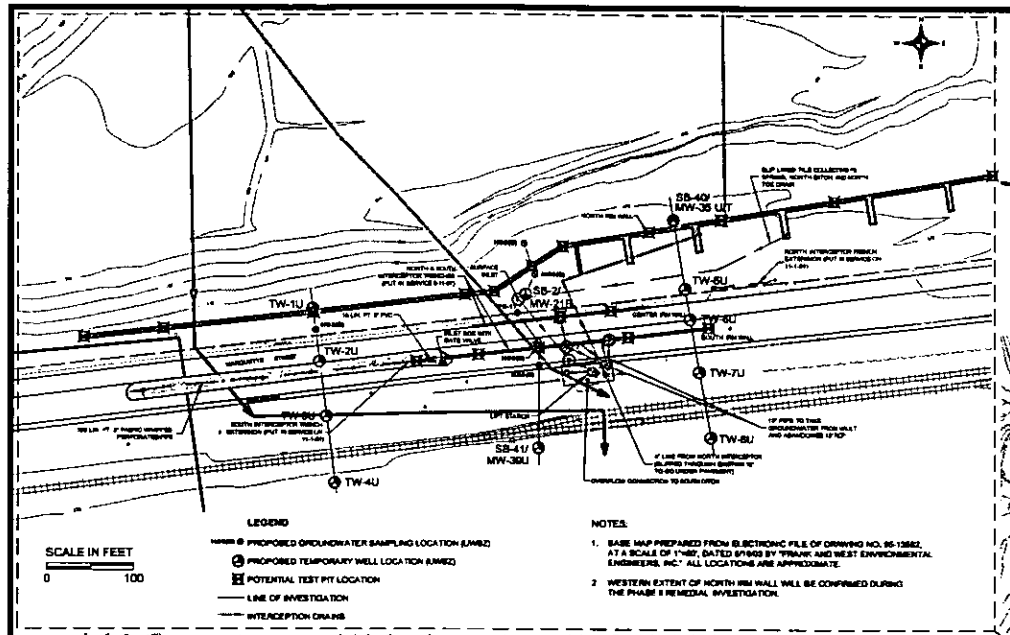


ENVIRON

BOUNDING OF bis (2-ETHYLHEXYL) PHTHALATE CONCENTRATION ABOVE RISK-BASED SCREENING VALUE AT PS-02

PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE:	CONTRACT NUMBER:		FIGURE
06/14/07	21-12046E2		2
DRAFTER: APR	APPROVED:	REVISED:	



- W2D ▲ MONITORING WELL (BASE OF LOWER AQUIFER)
- W5S ◆ MONITORING WELL (TOP OF LOWER AQUIFER)
- W11S ■ MONITORING WELL (UWBZ OR AQUITARD)
- W3S ⊠ MONITORING WELL (BLUFF UNDIFFERENTIATED)
- PZ4S ● PIEZOMETER (UWBZ OR AQUITARD)
- PZ4I △ PIEZOMETER (TOP OF LOWER AQUIFER)

OTHER LOCATIONS

- PS-11 EXISTING MONITORING WELL OR PIEZOMETER (TOP OF LOWER AQUIFER)
- HS11(S) EXISTING MONITORING WELL OR PIEZOMETER (UWBZ OR AQUITARD)
- HH-03 HH/DANIEL B. STEPHENS TEMPORARY AND PERMANENT MONITORING WELL
- PROPOSED PHASE II RI MONITORING WELL (UWBZ)
- PROPOSED GROUNDWATER AND SEEP SAMPLING LOCATION (UWBZ)
- PROPOSED PHASE II RI MONITORING WELL (TOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (TOLA)
- PROPOSED PHASE II RI MONITORING WELL (BOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BLUFF UNDIFFERENTIATED)

UWBZ = UPPER WATER-BEARING ZONE
TOLA = TOP OF LOWER AQUIFER
BOLA = BASE OF LOWER AQUIFER
CAMU = CORRECTIVE ACTION MANAGEMENT UNIT

ABANDONED MONITORING WELL OR PIEZOMETER

WELL WITH bis (2-ETHYLHEXYL) PHTHALATE CONCENTRATION ABOVE RISK-BASED SCREENING VALUE

BOUNDING WELL

APPROXIMATE AREA OF FORMER PLANT SITE AND UPLAND PORTION OF THE SOUTHEAST AREA

APPROXIMATE AREA OF BLUFF AREA

HISTORICAL FEATURE

PHASE I RI SAMPLING LOCATIONS:

UTILITIES

- 1904: OPEN DITCH
- 1907: 2.5-INCH WATER 3-INCH SEWER
- 1907: 36-INCH SEWER, 24-INCH SUCTION, 4-INCH WATER
- 1912: 15-INCH STORM SEWER
- 1916: SEWER
- 1918: 8-INCH VIT. DRAIN
- PRE-1920: 36-INCH DRAIN AND OPEN DITCH
- 1920: 18-INCH TILE
- 1920: 36-INCH STORM
- 24-INCH TILE
- 1955: WATER LINES
- 1986: 48-INCH RCP
- 8-INCH WATER LINES

NOTES:

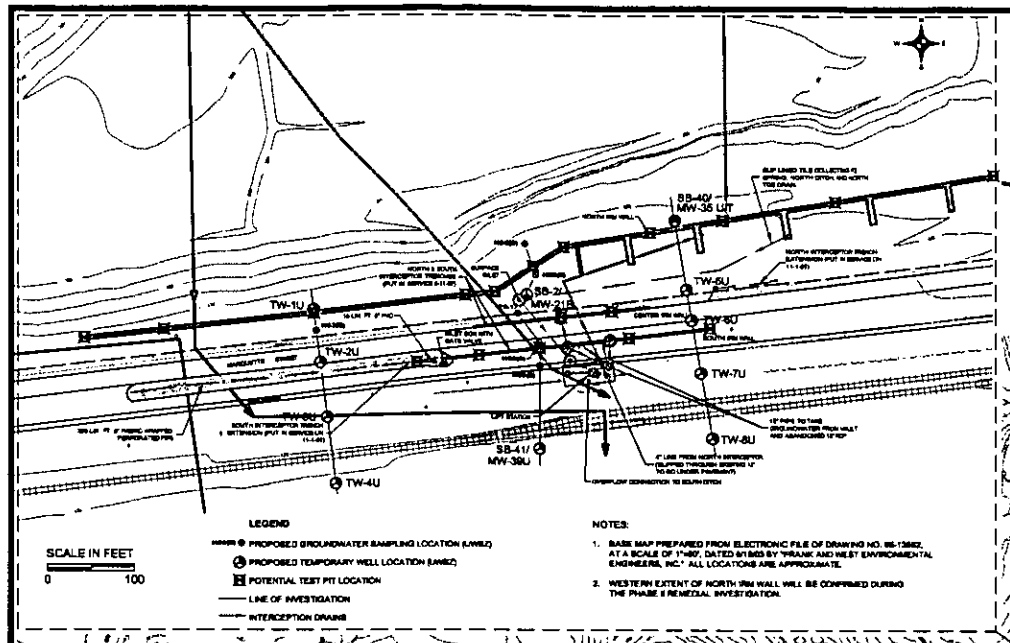
1. BASE MAP FROM FIGURE 1 OF PHASE I SITE-WIDE REMEDIAL INVESTIGATION DATA REPORT, ADDENDUM I DATED JANUARY 30, 2001 AT A SCALE OF 1" = 400', PROVIDED BY GOLDER ASSOCIATES.
2. ALL LOCATIONS ARE APPROXIMATE.
3. THE FOLLOWING UWBZ WELLS WILL BE SAMPLED AS PART OF THE EVALUATION OF THE IRM WALLS AND INTERCEPTION TRENCHES: HS3, HS6, HS8, HS9, HS9, PS-17.
4. TWO ADDITIONAL UWBZ WELLS MAY BE INSTALLED ALONG THE NORTHERN PERIMETER OF FPBA, IF EXISTING WELLS CANNOT BE USED AS BACKGROUND WELLS

0 240 480
SCALE IN FEET

ENVIRON

BOUNDING OF bis (2-ETHYLHEXYL) PHTHALATE CONCENTRATION ABOVE RISK-BASED SCREENING VALUE AT PS-03
PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE	CONTRACT NUMBER		FIGURE
06/14/07	21-12046E2		3
DRAFTER: APR	APPROVED	REVISED	



- APPROXIMATE AREA OF FORMER PLANT SITE AND UPLAND PORTION OF THE SOUTHEAST AREA
- APPROXIMATE AREA OF BLUFF AREA
- HISTORICAL FEATURE

PHASE I RI SAMPLING LOCATIONS:

- W2D ▲ MONITORING WELL (BASE OF LOWER AQUIFER)
- W5S ◆ MONITORING WELL (TOP OF LOWER AQUIFER)
- W11S ■ MONITORING WELL (UWBZ OR AQUITARD)
- W3S ⊠ MONITORING WELL (BLUFF UNDIFFERENTIATED)
- PZ4S ● PIEZOMETER (UWBZ OR AQUITARD)
- PZ4I △ PIEZOMETER (TOP OF LOWER AQUIFER)

OTHER LOCATIONS

- PS-11 ◐ EXISTING MONITORING WELL OR PIEZOMETER (TOP OF LOWER AQUIFER)
- HS11(S) ◍ EXISTING MONITORING WELL OR PIEZOMETER (UWBZ OR AQUITARD)
- HH-03 ○ HH/DANIEL B. STEPHENS TEMPORARY AND PERMANENT MONITORING WELL

- PROPOSED PHASE II RI MONITORING WELL (UWBZ)
- PROPOSED GROUNDWATER AND SEEP SAMPLING LOCATION (UWBZ)
- PROPOSED PHASE II RI MONITORING WELL (TOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (TOLA)
- PROPOSED PHASE II RI MONITORING WELL (BOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BOLA)
- PROPOSED GROUNDWATER SAMPLING LOCATION (BLUFF UNDIFFERENTIATED)

UWBZ = UPPER WATER-BEARING ZONE
TOLA = TOP OF LOWER AQUIFER
BOLA = BASE OF LOWER AQUIFER
CAMU = CORRECTIVE ACTION MANAGEMENT UNIT

- ABANDONED MONITORING WELL OR PIEZOMETER
- WELL WITH HEPTACHLOR EPOXIDE CONCENTRATION ABOVE RISK-BASED SCREENING VALUE
- BOUNDING WELL

UTILITIES

- 1904: OPEN DITCH
- 1907: 2.5-INCH WATER 3-INCH SEWER
- 1907: 36-INCH SEWER 24-INCH SUCTION 4-INCH WATER
- 1912: 18-INCH STORM SEWER
- 1918: SEWER
- 1918: 8-INCH VIT. DRAIN
- PRE-1920: 36-INCH DRAIN AND OPEN DITCH
- 1920: 18-INCH TILE
- 1920: 36-INCH STORM
- 24-INCH TILE
- 1958: WATER LINES
- 1986: 48-INCH RCP
- 8-INCH WATER LINES

NOTES:

1. BASE MAP FROM FIGURE 1 OF PHASE I SITE-WIDE REMEDIAL INVESTIGATION DATA REPORT, ADDENDUM 1 DATED JANUARY 30, 2001 AT A SCALE OF 1" = 400', PROVIDED BY GOLDER ASSOCIATES
2. ALL LOCATIONS ARE APPROXIMATE.
3. THE FOLLOWING UWBZ WELLS WILL BE SAMPLED AS PART OF THE EVALUATION OF THE IRM WALLS AND INTERCEPTION TRENCHES: HS3, HS5, HS6, HS8, HS9, PS-17.
4. TWO ADDITIONAL UWBZ WELLS MAY BE INSTALLED ALONG THE NORTHERN PERIMETER OF FPSA, IF EXISTING WELLS CANNOT BE USED AS BACKGROUND WELLS

ENVIRON

BOUNDING OF HEPTACHLOR EPOXIDE CONCENTRATION ABOVE RISK-BASED SCREENING VALUE AT W8S

PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE	CONTRACT NUMBER		FIGURE
06/14/07	21-12046E2		4
DRAWER: APR	APPROVED:	REVISED:	

ENVIRON

July 20, 2007

Mr. Richard Lange
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

Re: Phase II Remedial Investigation Work Plan
Summary of Meeting to Resolve Outstanding Comments
DePue Site, DePue, Illinois

Dear Mr. Lange:

ENVIRON International Corporation ("ENVIRON"), on behalf of the DePue Group, has prepared this letter to summarize the resolution to the Illinois Environmental Protection Agency's (IEPA's) outstanding comments on ENVIRON's August 2006 Work Plan for Phase II Remedial Investigation (the "Phase II RI Work Plan") for the DePue Site in DePue, Illinois. The IEPA's concerns were initially transmitted in an October 20, 2006 comment letter on the Phase II RI Work Plan. ENVIRON provided a response to those comments in a January 8, 2007 response to comments letter. Subsequently, the IEPA's concerns were further clarified in an April 6, 2007 comment letter and a meeting on June 8, 2007. ENVIRON provided responses to the additional comments in an April 23, 2007 letter and a June 19, 2007 letter. The sections below outline the additional issues and resolutions for those issues as discussed at the July 18, 2007 meeting. On your approval of this letter, a revised Phase II RI Work Plan will be prepared that incorporates the changes that were discussed in the various response letters so that there is a final document that accurately presents the work that will be performed at the study area as part of the Phase II RI.

WELL LOCATIONS

The IEPA expressed concern that additional wells may be needed to characterize the interior of the Former Plant Site Area to aid in the selection of the final remedy for the study area. In addition, there was concern that additional wells may be needed downgradient of the Former Plant Site Area for delineation purposes. However, because the need for additional wells is dependent on the results of the sampling at the study area perimeter currently proposed as part of the Phase II RI, the DePue Group has proposed to complete the Phase II RI as an iterative process. Therefore, installation and sampling of the perimeter wells will be completed prior to making decisions about the need for additional wells. Specifically, if the results from the perimeter wells indicate that parameters from the study area are likely migrating off-site, downgradient well locations will be proposed. If, instead, the study area parameters are not detected in the perimeter wells above applicable screening levels, additional wells may be proposed for the interior of the study area to aid in subsequent remedy selection.

As previously agreed to facilitate completion of the Phase II RI using an iterative process, the results from each round of quarterly groundwater sampling will be summarized in a technical memorandum and submitted to the IEPA within 90 days of the receipt of the validation report. Following IEPA review of the technical memoranda, the DePue Group and IEPA will concur on the necessity for additional activities.

UPDATED HCOPC SCREENING FOR GROUNDWATER SAMPLING

The selection of the human health constituents of potential concern (HCOPCs) has been finalized for the groundwater sampling. As discussed in the meeting, the parameters that were detected in groundwater above their risk-based screening level have been selected as HCOPCs for the groundwater sampling. The list of HCOPCs for the groundwater sampling is included in Table 1. In addition to the parameters listed on Table 1, there were ten additional parameters that were detected above risk-based screening levels. These ten parameters include eight polynuclear aromatics (PNAs) [i.e., benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene], one semivolatile organic compound (SVOC) [i.e., bis(2-ethylhexyl)phthalate], and one pesticide [i.e., heptachlor epoxide]. These parameters have been addressed differently because they had a low frequency of detection. These parameters have been addressed as follows:

- Eight PNAs. The eight PNAs were detected during one sampling event at one location with a frequency of detection of 0.57%. Because of the very low frequency of detection, the distribution of the PNAs was evaluated, and based on the historical concentrations, the PNA concentrations are bounded by wells in which PNAs were not detected. During the first round of groundwater monitoring, the well where the PNAs were initially detected and the four bounding wells will be resampled. Specifically, wells PS-08, W4S, W10S, PZ-2S, and W22S will be sampled for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene during the first round of groundwater monitoring. If none of the PNAs are detected above risk-based screening values in any of these wells, these PNAs will be removed from the list of HCOPCs for groundwater sampling for future rounds of groundwater monitoring. If the PNAs are detected above risk-based screening values, the sampling locations will be evaluated for future sampling events.

- bis(2-Ethylhexyl)phthalate. The SVOC, bis(2-ethylhexyl)phthalate, was detected above the risk-based screening value in two wells (i.e., during the December 1999 sampling event in monitoring well PS-02 and during the August 2000 sampling event in monitoring well PS-03) at a maximum concentration of 49 µg/L. Phthalates below 100 µg/L are considered common laboratory contaminants.[1] Because of the low frequency of detection and the likelihood that the concentration of bis(2-ethylhexyl)phthalate is a laboratory artifact, this parameter has been removed from the list of HCOPCs for groundwater sampling.

- Heptachlor epoxide. The pesticide, heptachlor epoxide was detected above the risk-based screening value in one well, W8S during the December 1999 sampling event. Because of the low frequency of detection, the distribution of heptachlor epoxide was evaluated, and based on the historical concentrations, the heptachlor epoxide concentration is bounded by wells in which heptachlor epoxide was not detected. During the first round of groundwater monitoring, the well where the heptachlor epoxide was initially detected and the four bounding wells will be resampled. Specifically, wells W8S, W11S, W7S, W9S, and PZ-2S will be sampled for heptachlor epoxide during the first round of groundwater monitoring. If heptachlor epoxide is not detected above risk-based screening values in

[1] United States Environmental Protection Agency Office of Emergency and Remedial Response. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*. OSWER 9240.1-05A-P. October 1999. p 77.

any of these wells, heptachlor epoxide will be removed from the list of HCOPCs for groundwater sampling for future rounds of groundwater monitoring. If heptachlor epoxide is detected above risk-based screening values, the sampling locations will be evaluated for future sampling events.

CONCLUSIONS

Based on the items discussed in the sections above, we believe that all of the IEPA's concerns regarding the Phase II RI Work Plan have been addressed. An updated revision of the Phase II RI Work Plan will be prepared based on the IEPA's comments and the responses to those comments.

I trust that the above evaluation provide sufficient information for work to proceed. Please contact us if you have any questions regarding this response.

Sincerely,

ENVIRON International Corporation

Mark A. Travers
Co-Project Coordinator

Angela E. DeDolph
Project Manager

Enclosures

cc: Kevin Philips – Ecology and Environment (2 copies)
Joe Abel – ExxonMobil Corporation
Jeff Groy – CBS Operations Inc.
Steve Walker – Terra Environmental Services

TABLE

TABLE 1

Updated List of HCOPCs To Be Used
for Quarterly Groundwater Monitoring
DePue Site
DePue, Illinois

Total Inorganics (mg/L)

Aluminum
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Manganese
Mercury
Nickel
Selenium
Silver
Thallium
Vanadium
Zinc

Miscellaneous

Ammonia as N
Fluoride
Nitrate+Nitrite as N
Nitrite as N
Phosphorus, Total
Sulfate

Radionuclides

Radium 228 Gamma

HCOPC = Human Health Constituent of Potential Concern

ENVIRON

July 26, 2007

Mr. Richard Lange
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

Re: Phase II Remedial Investigation Work Plan
Response to Comments on Summary of Meeting
to Resolve Outstanding Comments
DePue Site, DePue, Illinois

Dear Mr. Lange:

ENVIRON International Corporation (ENVIRON), on behalf of the DePue Group, has prepared this letter to respond to your comments on our July 20, 2007 letter summarizing the meeting to discuss resolution of the Illinois Environmental Protection Agency's (IEPA's) outstanding comments on ENVIRON's August 2006 Work Plan for Phase II Remedial Investigation (the "Phase II RI Work Plan") for the DePue Site in DePue, Illinois. The IEPA's comments are reproduced below in italic type with ENVIRON's response following indented and in regular type. On your approval of this letter, a revised Phase II RI Work Plan will be prepared that incorporates the changes that were discussed in the various response letters so that there is a final document that accurately presents the work that will be performed at the study area as part of the Phase II RI.

"*In the Well Locations discussion the letter notes "90 days of receipt of the validation report". It was my intention to expidite the process in my discussion and request. Validation wasn't mentioned. I'd like to see the data summarized simply and in our hands 90 days from the date of sampling. Flag it Draft Pending Validation or better yet expidite the validation, what ever but we need to get the process streamlined and validation has historicaly been a slow finish.*"

ENVIRON will provide all available data within 90 days after the date of sampling. If validation is completed, validated results will be provided. If validation is not completed within 90 days of sampling, preliminary data will be provided.

"*In the "Update HCOPC ....." discussion the first sentence notes the finalization of the HCOPC list for the ground water sampling. Some way we managed to skirt the issue of compounds detected at any concentration that affect the same target organ or system. I know in the strickt read of the HCOPC selection sequence none of these compounds met the first criteria of exceeding a screening value however we've always insisted the "chemical specific factors" take primacy. The metal parameters potentially affected because of this issue remain HCOPCs for other reasons but the 3 or 4 VOCs detected are not included as current HCOPCs nor are they in the Bounded Area concept discussion. This can be resolved by adding a few targeted samples to specific wells as we agreed to do with the PNAs, bis and the Heptochlor.*

"*We can agree on the specific wells in the field if sufficient bottles are available in hand, or they can be ordered early in the field start of sampling with plenty of time to collect them during the later segments of the sampling effort.*"

ENVIRON respectfully disagrees with your characterization of the groundwater sampling human health constituent of potential concern (HCOPC) discussion as it relates to volatile organic compounds (VOCs). Rather than "skirt the issue," this was the first issue discussed with respect to the HCOPC selection. During this discussion, it was noted that the three VOCs with potential "chemical specific factors" (i.e., ethylbenzene, toluene, and xylenes) were each detected only once out of 73 samples during the quarterly sampling and that all were significantly below the minimum screening values. In addition, we discussed the lack of industrial activity at the Site for at least the past 20 years and that VOCs tend to degrade over time, so if they were not detected at significant concentrations during the previous quarterly sampling, they are not likely to be detected at this time. At the conclusion of this discussion, you agreed that VOCs should not be sampled for during our upcoming groundwater monitoring. Based on this discussion, we continue to believe that sufficient data have been collected regarding VOCs and that no additional VOC sampling is necessary.

I trust that the above responses provide sufficient information for work to proceed. Please contact us if you have any questions regarding this response.

Sincerely,

ENVIRON International Corporation

Mark A. Travers
Co-Project Coordinator

Angela E. DeDolph
Project Manager

Enclosures

cc: Kevin Philips – Ecology and Environment (2 copies)
Joe Abel – ExxonMobil Corporation
Jeff Groy – CBS Operations Inc.
Steve Walker – Terra Environmental Services

ENVIRON

September 19, 2007

Mr. Richard Lange
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

Re: Phase II Remedial Investigation Work Plan
Response to April 13, 2007 Comments Addendum No. 1
DePue Site, DePue, Illinois

Dear Mr. Lange:

ENVIRON International Corporation ("ENVIRON"), on behalf of the DePue Group, has prepared this addendum to the response to the Illinois Environmental Protection Agency's (IEPA's) comments on ENVIRON's August 2006 Work Plan for Phase II Remedial Investigation (the "Phase II RI Work Plan"). The original comments were transmitted in your April 13, 2007 email and further clarified in a meeting on May 8, 2007. The comments in the April 13, 2007 email were addressed in ENVIRON's May 23, 2007 response to comments letter. One additional issue was identified at the May 8, 2007 meeting: a request that the number of soil samples collected in the former plant site area (FPSA) be evaluated to determine if sufficient soil samples have been collected to characterize the FPSA. This evaluation has been performed and is summarized in this letter.

As requested in the May 8, 2007 meeting, ENVIRON has followed the same statistical approach that was used to develop the sediment sampling approach for DePue Lake, which was summarized in a January 6, 2006 letter prepared by Blasland, Bouck & Lee, Inc. The sampling approach for DePue Lake was developed for the initial sampling. In the case of the FPSA, soil sampling has been performed, and the sampling approach developed will be used to determine if additional samples need to be collected from the FPSA.

As done with DePue Lake, a grid-based sampling approach has been developed for the FPSA. The grid-based sampling approach has been developed in accordance with the USEPA's February 1989 *Guidance for Evaluating the Attainment of Cleanup Standards* (EPA 230/02-89-042) and using methods described in Chapter 10 of *Statistical Methods for Environmental Pollution Monitoring*, a statistical textbook written by Richard O. Gilbert in 1987 (the "Gilbert textbook"). The methodology determines the grid size required to locate hot spots of a specified shape and minimum size at a specified level of confidence.

For the FPSA, it was assumed that the hot spots of interest are approximately 5 acres in area, circular in shape, and the chance of finding the hot spot should be at least 95%. Using these assumptions and Figure 10.3 in the Gilbert textbook, the corresponding L/G is 0.6. The L/G is the ratio of the radius of the hypothetical circular hot spot (L) and the grid spacing (G). Given that the hypothetical hot spot is 5 acres in area (217,800 ft^2), the corresponding L is 263 feet. Solving for G results in a grid spacing of approximately 440 feet.

As shown on Figure 1, a grid with 440-foot spacing has been overlaid on the FPSA. The sampling density for the Slag Pile Area and the Lithopone Ridges Area was evaluated in Appendix A of the Phase II RI Work Plan, so those areas have not been evaluated herein. The grid nodes located in the Eastern Area, Western Area, and the Upland Portion of the Southeast Area and the sampling locations corresponding to each grid node are listed in Table 1. As shown

in the table, existing samples are located near the grid nodes in all but two locations, where proposed sample locations are near the grid nodes. In these two locations (i.e., SB-4 and SB-9), additional soil samples will be collected and analyzed.

At the proposed sample locations (i.e., SB-4 and SB-9), the methodology described in the existing site-wide Field Sampling Plan (the "FSP") for the DePue Site (Appendix A of the DePue Site Remedial Investigation Phase 1 Soil and Groundwater Sampling Plan prepared by Golder Associates, Inc., dated June 24, 1999. Specifically, at each of the locations, the boring will be advanced to the water table. If native soil is not encountered before the water table, the boring will be advanced until native soil is encountered. It is anticipated that the total depth of the borings will be 10 to 20 feet below ground surface (bgs) for the purposes of this sampling. Because these soil borings are being used for multiple purposes, they may be advanced deeper for other purposes as outlined in the Phase II RI Work Plan. Up to four intervals from each soil boring will be submitted to the analytical laboratory for analysis based on the following:

- A surface sample from the 0- to 0.5-foot bgs interval (below compost whenever present) will be submitted for analysis;
- The last fill soil interval above the water table will be submitted, unless the water table occurs at less than 3 ft bgs, in which case a second fill sample will not be submitted;
- The first interval of native soil below the fill is to be submitted;
- If native soil is encountered above the water table, the last native soil interval above the water table will be submitted.

As was done for the soil sampling during the Phase I RI, the soil boring will be sampled in 2.5-foot intervals. If both fill and native soils are encountered in the same interval, the interval will be divided at the interface between the fill and native soils.

The analysis selected for each boring will also be based on the FSP. The FSP identified analytical suites for the sampling at the Site. Suite 1 "is the standard set of analyses and will be conducted on all soil samples submitted to the analytical laboratory (except samples submitted for Suite 1a)."[1] As specified in the FSP, Suite 1 includes arsenic, barium, cadmium, copper, lead, manganese, zinc, pH, total phosphorus, total sulfur, ammonia, and nitrate-nitrite. Suite 1a "consists of the complete EPA Contract Laboratory Program (CLP) list of compounds to be conducted on approximately 10% of all soil samples collected."[2] At a minimum, all intervals sampled from the two soil boring locations identified above will be analyzed for Suite 1. In addition, one interval from each of the two soil borings will be selected for Suite 1a analysis. This will ensure that at least 10% of the samples are analyzed for Suite 1a and that the analyses are distributed across the Site. For reference, the analyses performed in the previously sampled locations are listed in Table 1.

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[1] Golder Associates, Inc. (June 24, 1999) Field Sampling Plan for the DePue Site (Appendix A of the DePue Site Remedial Investigation Phase 1 Soil and Groundwater Sampling Plan. p. 13.

[2] *Ibid.*

I trust that this response provides sufficient information for work to proceed. Please contact us if you have any questions regarding this response.

Sincerely,

ENVIRON International Corporation

Mark A. Travers
Co-Project Coordinator

Angela E. DeDolph
Project Manager

Enclosures

cc: Kevin Philips – Ecology and Environment (2 copies)
Joe Abel – ExxonMobil Corporation
Jeff Groy – CBS Operations Inc.
Steve Walker – Terra Environmental Services

TABLE

TABLE 1

Summary of Samples Collected Near Grid Nodes
DePue Site
DePue, Illinois

Grid Node	Corresponding Sample Location	Suites of Parameters Analyzed
Grid Nodes in the Eastern Area, Western Area, and the Upland Portion of the Southeast Area		
C02	SS-04	VOCs, PAHs, Metals, Wet Chemistry
C03	SS-08	VOCs, PAHs, Metals, Wet Chemistry
C04	SS-09	VOCs, PAHs, Metals, Wet Chemistry
C05	SS-12	VOCs, PAHs, Metals, Wet Chemistry
C06	SB-9 (New Phase II Soil Boring)	
C09	K2	Metals, Wet Chemistry
C10	SS-56	Metals, Wet Chemistry
C11	K5	PAHs, Metals, Wet Chemistry
D02	I1	PAHs, Metals, Wet Chemistry
D03	I2	VOCs, SVOCs, Pesticides, PCBs, Metals, Wet Chemistry
D04	I3	VOCs, SVOCs, Pesticides, PCBs, Metals, Wet Chemistry
D05	I5	Metals, Wet Chemistry
D06	I6	PAHs, Metals, Wet Chemistry
D07	SB-4 (New Phase II Soil Boring)	
E03	W14S	Metals, Wet Chemistry
E04	H2	Metals, Wet Chemistry
E05	SS-10	Metals, Wet Chemistry
E06	W15S	Metals, Wet Chemistry
E07	SL-C	Metals, Wet Chemistry
E08	Z-7	Metals, Wet Chemistry
E09	SS-40	VOCs, PAHs, Metals, Wet Chemistry
E10	HH-12	Metals, Wet Chemistry
F04	SL-E	Metals, Wet Chemistry
F05	F1	Metals, Wet Chemistry
F06	F3	PAHs, Metals, Wet Chemistry
F07	Z-2	Metals, Wet Chemistry
F08	G7	PAHs, Metals, Wet Chemistry
G07	C1	Metals, Wet Chemistry
Grid Nodes in the Slag Pile Area (Density Previously Evaluated)		
D08	Slag Pile Area	N/A
D09	Slag Pile Area	N/A
D10	Slag Pile Area	N/A
D11	Slag Pile Area	N/A
Grid Nodes in the Lithopone Ridges Area (Density Previously Evaluated)		
F09	Lithopone Ridges Area	N/A
F10	Lithopone Ridges Area	N/A
G08	Lithopone Ridges Area	N/A
G09	Lithopone Ridges Area	N/A

Key:
VOC = Volatile organic compound
PAH = Polynuclear aromatic hydrocarbon
SVOC = Semivolatile organic compound
N/A = Not applicable

FIGURE

LEGEND:

- APPROXIMATE AREA OF FORMER PLANT SITE AND UPLAND PORTION OF THE SOUTHEAST AREA
- APPROXIMATE AREA OF BLUFF AREA
- HISTORICAL FEATURE

PHASE I RI SAMPLING LOCATIONS:

- WP1 ● TEMPORARY WELL POINT
- J1 X BORING
- LY2 ✚ LYSIMETER
- W2D ▲ MONITORING WELL (BASE OF LOWER AQUIFER)
- W5S ◆ MONITORING WELL (TOP OF LOWER AQUIFER)
- W11S ■ MONITORING WELL (UWBZ OR AQUITARD)
- W3S ▣ MONITORING WELL (BLUFF UNDIFFERENTIATED)
- PZ4S ⊕ PIEZOMETER (UWBZ OR AQUITARD)
- PZ4I △ PIEZOMETER (TOP OF LOWER AQUIFER)

OTHER LOCATIONS

- PS-11 ◐ EXISTING MONITORING WELL OR PIEZOMETER (TOP OF LOWER AQUIFER)
- HS11(S) ◔ EXISTING MONITORING WELL OR PIEZOMETER (UWBZ OR AQUITARD)
- HH-03 ○ HH/DANIEL B. STEPHENS TEMPORARY AND PERMANENT MONITORING WELL
- SS-05 ◘ EXXONMOBIL SUPPLEMENTAL ZINC PROCESSING WASTE SAMPLES
- SL-G ⊡ EXXONMOBIL SUPPLEMENTAL INVESTIGATION SAMPLES
- TA-1 ⊖ EXXONMOBIL SUPPLEMENTAL SAMPLES
- Z-11 ⊞ VIACOM SOIL BORING
- Z-9 ⊕ VIACOM TEMPORARY MONITORING WELL
- S-250 ⊟ VIACOM SAMPLING LOCATION
- ABC-1 ⊠ VIACOM ABC BORING
- SHELBY-1 ◍ SHELBY TUBE SAMPLE
- N001 ○ SPRING SAMPLE LOCATION
- CSB-1 ✱ CAMU INVESTIGATION BORING
- PROPOSED HYDRAULIC CONDUCTIVITY LOCATION (UWBZ)
- PROPOSED TCLP/SPLP, IGNITABILITY, CORROSIVITY, AND REACTIVITY SAMPLE LOCATION
- PROPOSED SOIL BORING LOCATION
- PROPOSED PHASE II RI WELL
- PROPOSED THIN WALL PERMEABLE TEST LOCATION/PROPOSED GEOTECHNICAL SAMPLE LOCATION (AQUITARD)
- PROPOSED GEOTECHNICAL SAMPLE LOCATION (NON-NATIVE MATERIAL)
- PROPOSED NATIVE GEOCHEMISTRY SAMPLE LOCATION
- PROPOSED NON-NATIVE GEOCHEMISTRY SAMPLE LOCATION
- PROPOSED SURFACE WATER AND SEDIMENT SAMPLING LOCATION

UWBZ = UPPER WATER-BEARING ZONE

CAMU = CORRECTIVE ACTION MANAGEMENT UNIT

NOTES:

1. BASE MAP FROM FIGURE 1 OF PHASE I SITE-WIDE REMEDIAL INVESTIGATION DATA REPORT, ADDENDUM 1 DATED JANUARY 30, 2001 AT A SCALE OF 1" = 400', PROVIDED BY GOLDER ASSOCIATES.
2. ALL LOCATIONS ARE APPROXIMATE.
3. TWO ADDITIONAL UWBZ WELLS MAY BE INSTALLED ALONG NORTHERN PERIMETER OF HSA IF EXISTING WELLS CANNOT BE USED AS BACKGROUND WELLS.

0 240 480
SCALE IN FEET

ENVIRON

SAMPLING GRID FOR FORMER PLANT SITE AREA
PHASE II REMEDIAL INVESTIGATION WORK PLAN
DEPUE SITE
DEPUE, ILLINOIS

DATE	CONTRACT NUMBER		FIGURE
06/06/07	21-12046E2		1
DRAFTER: APR	APPROVED	REVISED	

ENVIRON

October 3, 2007

Mr. Richard Lange
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

Re: Phase II Remedial Investigation Work Plan
Summary of Meeting to Discuss Upcoming Field Work
OU3: Former Plant Site Area, Upland Portion of the Southeast Area, and Bluff Area
Phase II Remedial Investigation
DePue Site, DePue, Illinois

Dear Mr. Lange:

ENVIRON International Corporation ("ENVIRON"), on behalf of the DePue Group, has prepared this letter to summarize the discussion September 25, 2007 between the Illinois Environmental Protection Agency (IEPA) and the DePue Group related to ENVIRON's August 2006 Work Plan for Phase II Remedial Investigation (the "Phase II RI Work Plan") and related comment letters for OU3 of the DePue Site in DePue, Illinois. The IEPA's concerns with the original Phase II RI Work Plan were transmitted in an October 20, 2006 comment letter, April 6, 2007 comment letter, and were further clarified in meetings. ENVIRON provided a response to the IEPA's comments in a January 8, 2007 letter, a May 23, 2007 letter, a June 19, 2007 letter, a July 20, 2007 letter, a July 26, 2007 letter, and a September 19, 2007 letter. The purpose of the September 25, 2007 meeting was to discuss the schedule of the upcoming Phase II RI field work and discuss the changes to the Phase II RI Work Plan. A revised Phase II RI Work Plan will be prepared that incorporates the changes that were discussed in the various response letters so that there is a final document that accurately presents the work that will be performed at the study area as part of the Phase II RI. The following sections summarize the discussions at the September 25, 2007 meeting and the resolution of any issues that were discussed.

SCHEDULE

A schedule for the upcoming field work has been prepared. Below are the dates that have been set at this point. Additional tasks will be scheduled; however, the exact dates of those tasks will depend on the completion dates for the currently scheduled tasks.

September 24, 2007:	Test pit excavation around north IRM wall.
October 3, 2007:	Clean out of manholes on middle and south IRM walls.
October 3-5, 2007:	Begin drilling activities (1 rig).
October 8-17, 2007:	Continue drilling activities (2 rigs).

After completion of drilling, the development and sampling of the newly installed wells will be scheduled and the additional trenching activities for the utility lines and along the railroad will be performed. As these tasks are scheduled, the dates will be forwarded.

CHANGES TO THE PHASE II RI WORK PLAN

During the meeting, the changes to the Phase II RI Work Plan that were proposed in response to the various comment letters were discussed. In addition, some of the details that were not included in the Phase II RI Work Plan were discussed and agreed on. The significant changes include the following:

- Addition of test pits along historical utility corridors (January 8, 2007 Response to Comments letter, Section 5.1.2, Comment b). Test pits will be excavated in the historic utility locations shown on the figure. In addition, during the site walk after the meeting, several additional utility locations were identified. Test pits will also be excavated in these areas. The purpose of these test pits is to determine if the utilities have been abandoned (if possible), determine the location and depth of the utilities, and determine the general alignment. Soil and/or groundwater sample may be collected from the trenches based on conditions observed in the field. If zinc slag is observed in the utility trench, it does not need to be sampled. If other fill is observed, it may need to be sampled. The decision to sample will be based on consultation with IEPA in the field. In each area where samples are collected, at least one soil samples will be analyzed for Suite 1a constituents, and any additional soil samples will be analyzed for Suite 1 constituents. Any water samples will be analyzed for the groundwater HCOPCs (May 23, 2007 Response to Comments letter, Section 5.1.2). If both a water and soil sample are collected from an area, the water sample will be filtered. If only a water sample is collected, both filtered and unfiltered samples will be analyzed.

- Movement/addition of the following monitoring well locations: (1) the movement of the westernmost B sample (i.e., MW-20B) to the south property line, (2) addition of the northernmost U/B samples located in the Lithopone Ridges Area (i.e., MW-41U/B), and (3) addition of easternmost U/T/B samples located in the VPCDA near well W-22S (i.e., MW-40U/T/B). (January 8, 2007 Response to Comments letter, Section 5.2, Comment c; Section 5.2.2, Comment c).

- Addition of monitoring well MW-37U to evaluate potential high volume water source (January 8, 2007 Response to Comments letter, Section 5.2, Comment d). During the meeting it was determined that the proposed location shown on the figure at the time of the meeting was incorrect. During the site walk after the meeting, a stake was placed in the desired location of MW-37U, and that location will be surveyed. In addition, a request was made that the force main in the vicinity of MW-37U be added to the figure showing the proposed monitoring well locations. The location of the force main will be added to the figure.

- Conversion of the former TW-5U to a permanent well (January 8, 2007 Response to Comments letter, Section 5.2.5, Comment d). The former TW-5U has been renamed MW-39U. The remaining temporary well locations have been renumbered, so that the temporary well designations will be consecutive numbers rather than skipping TW-5U.

- Additional water level measurements around the IRM walls at wells MW-37U, W-18(S), HS-10(S), PZ-03(S), PZ-04(S), and HS-11(S) will be collected during the IRM evaluation (January 8, 2007 Response to Comments letter, Section 5.2.5, Comment e).

- Addition of seep sample location N005 (January 8, 2007 Response to Comments letter, Section 5.5). This location was sampled during the August 2007 round of groundwater sampling. In addition, during the meeting an additional seep sample location was identified to the east of N005. This location will be designated as N006, and will be sampled during the round of groundwater monitoring that will be performed for the newly installed monitoring wells. On September 26, 2007, the seep area was located, but no water was flowing. If no water is flowing during the sampling event, a sample will not be collected, but the sampling event will be considered complete.

- Collection of one round of groundwater samples from entire set of existing monitoring wells (May 23, 2007 Response to Comments letter, Section 5.0, Comment c; Section 5.2.2, Comment c). This round of groundwater sampling was performed during August 2007, and the preliminary results were presented to the IEPA in a September 18, 2007 letter report.

- Excavation of additional test pits along the railroad track (May 23, 2007 Response to Comments letter, General Comments). These test pits will be extended to a depth of approximately 1 foot below where native soil is observed. Soil and/or groundwater sample may be collected from the trenches based on conditions observed in the field. One soil sample from each area will be analyzed for Suite 1a constituents and any remaining soil samples will be analyzed for Suite 1 constituents. Any groundwater samples that are collected will be analyzed for the groundwater HCOPCs, which are identified in the July 20, 2007 response to comments letter. During the site walk after the meeting, the locations for the eastern set of test pits were staked and will be surveyed. The locations for the western set of test pits were not staked at that time because the utilities in that area had not been located. The selection of test pit locations for the western set of test pits will be performed in the field in consultation with IEPA after the utilities have been located.

- Selection of groundwater HCOPCs (July 20, 2007 and July 26, 2007 Response to Comments letters). The list of groundwater HCOPCs was used during the August 2007 round of groundwater monitoring, and will be used for any other groundwater samples collected during the Phase II RI field work.

- Evaluation of soil sampling density (September 19, 2007 Response to Comments letter). The IEPA's evaluation of this submittal is still underway. One preliminary question that was identified was the selection of a hot spot area of 5 acres. The 5-acre hot spot area was selected based on the historical use of the site and the proposed future development plans. Historically, the operations at the site occupied large areas; therefore, there should not be small localized areas of impact. Rather a 5-acre hot spot is likely a conservative estimate. In addition, the future use of the site was discussed. There is no intention on the part of any of the current owners to subdivide the property into residential properties or any other subdivisions that would result in properties of less than 5 acres. Therefore, a 5-acre hot spot area is a reasonable, conservative input for the evaluation of the soil sampling density.

PRELIMINARY RESULTS FROM ROUND 1 OF THE FIRST QUARTERLY GROUNDWATER MONITORING EVENT

The preliminary results of the August 2007 groundwater monitoring event were provided to the IEPA in a September 18, 2007 letter report. The initial quarterly event is being performed in two rounds so that the results from the existing network of groundwater monitoring wells can be used to evaluate the proposed locations of the additional monitoring wells, which will be sampled during round 2 of the first quarterly groundwater monitoring event. Based on the preliminary results presented in the September 18, 2007 letter report, no adjustment to the proposed locations for the new wells was deemed necessary. IEPA concurred with that conclusion during the meeting.

ADDITIONAL ISSUES

During the meeting, some additional issues were identified and discussed, including the following:

- The locations of the middle and south IRM walls make the excavation of test pits to locate the walls difficult. In both cases, the damage that will likely be caused by the excavation is greater than the benefit that would be gained by the excavation. The center IRM wall is located beneath a public sidewalk, which is used by local residents. The south IRM wall is covered by a geomembrane that was placed to help manage the subsurface water. Damaging the geomembrane by excavating down to the IRM wall could compromise its effectiveness, and repairs may not be sufficient to restore the geomembrane to its current level of effectiveness. It is understood that both of these IRM walls have access manholes that are connected to underdrain pipes that have the same orientation and length as the IRM walls. Therefore, it was determined that rather than excavate test pits along the walls, the access manholes would be used to determine the lengths of the middle and south IRM walls. As a first step the access manholes will be cleaned out to provide access to the underdrain pipes. This clean out is currently scheduled for October 2, 2007.

- During the meeting a question was raised about the construction methods that will be used for the temporary wells that will be installed to evaluate the hydraulics around the IRM walls. These temporary wells will be installed using the same methods as the permanent wells in the area. The reason these wells are referred to as temporary wells is because they will be abandoned when the hydraulic study is completed and the data have been evaluated. These wells will not be abandoned without consultation with the IEPA.

- In the future, the electronic version of the data submitted to the IEPA with the sampling reports will be provided in a single table format that combines the data with the location information such as northing and easting.

There is one additional detail for the sampling that was not clarified during the meeting. During the Phase II RI field work, surface water and sediment samples are proposed for collection from the North Ditch and the Former Settling Ponds. The surface water and sediment samples were proposed for HCOPC analysis in the Phase II RI Work Plan; however, based on the discussions of the HCOPCs for soils and groundwater, we would like to clarify the parameters for which these samples should be analyzed. We propose to sample the surface water samples for the groundwater HCOPCs, which is the list for which the surface water samples collected from the seeps were analyzed. For the sediment samples, we propose to follow a similar method at that used for the soil samples. In each area, one sediment sample will be selected for analysis of the

Suite 1a constituents based on field screening, and the remaining samples will be analyzed for the Suite 1 constituents.

I trust that the above summary accurately records the discussions at the September 25, 2007 meeting. Please contact us if you have any questions or comments regarding this summary.

Sincerely,

ENVIRON International Corporation

Mark A. Travers
Co-Project Coordinator

Angela E. DeDolph
Project Manager

Enclosures

cc: Kevin Philips – Ecology and Environment (2 copies)
Joe Abel – ExxonMobil Corporation
Jeff Groy – CBS Operations Inc.
Steve Walker – Terra Environmental Services

APPENDIX B

Evaluation of Number of Samples Required to Characterize Waste Piles

APPENDIX B

Evaluation of Number of Samples Required to Characterize Waste Piles

As part of this Phase II Remedial Investigation (RI) Work Plan, the number of samples required to characterize the Lithopone Ridges Area and Slag Pile Area was performed. The evaluation followed the guidance for Simple Random Sampling of waste, as presented in "Chapter 9 - Sampling Plan" of the United States Environmental Protection Agency (USEPA) publication SW-846 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* ("SW-846").

Chapter 9 of SW-846 provides a method for estimating the number of samples needed to characterize waste as hazardous or nonhazardous. After the samples are analyzed, the results are used to confirm that the number of samples that were collected were adequate to characterize the waste.

For the Slag Pile Area, and Lithopone Ridges Area, the methodology for Simple Random Sampling was used. The first step was determining which constituents will potentially be of concern. To determine the potential constituents of concern, the existing data were reviewed. For the purposes of this evaluation, only the toxicity characteristic was used as a regulatory threshold. The toxicity characteristic criteria from 40 Code of Federal Regulations (CFR) 261.24 were used for the screening. The toxicity characteristic criteria are compared to Toxicity Characteristic Leaching Procedure (TCLP) results from waste materials to determine if a waste is characteristically hazardous. There are TCLP results for six lithopone samples; however, there are no TCLP results for the slag samples. The Synthetic Precipitation Leaching Procedure (SPLP) results for the slag were therefore used as a surrogate. The SPLP results will not be used to characterize the slag as hazardous or nonhazardous. They are only being used in this evaluation because TCLP results are not yet available for the slag. The SPLP (slag) and TCLP (lithopone) results from the Revised Phase I RI Report are presented in Tables B-1 and B-2, respectively. The maximum concentration of each constituent was compared to the toxicity characteristic criteria from 40 CFR 261.24. Those constituents that had a maximum concentration above the toxicity characteristic criteria (i.e., barium for the Slag Pile Area; cadmium and lead for the Lithopone Ridges Area) were selected for the further evaluation.

The second step is estimating the mean and variance of the data for the selected constituents. The complete data set from the Revised Phase I RI Report for each of the

selected constituents was used. As specified in Chapter 9 of SW-846, the mean ($\bar{x}$) and variance (s^2) are estimated using the following equations:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

$$s^2 = \frac{\sum_{i=1}^{n} x_i^2 - \frac{\left(\sum_{i=1}^{n} x_i\right)^2}{n}}{n-1}$$

where:

n = current number of samples

The mean ($\bar{x}$) and variance (s^2) are then used to estimate the number of samples that will need to be collected from the waste (n) using the following equation:

$$n = \frac{t_{0.20}^2 s^2}{(RT - \bar{x})^2}$$

where:

$t_{0.20}$ = the tabulated "t" value for the appropriate degrees of freedom (DF)

RT = regulatory threshold

DF = one less than the current number of samples

The calculation of the number of samples that will need to be collected from the waste was performed for each of the selected constituents and is presented in Tables B-1 and B-2. These calculations estimate that 3 samples will be needed to characterize the slag and 16 samples will be needed to characterize the lithopone. The Phase II RI Work Plan proposes to collect more than 3 slag samples because these calculations are based on the SPLP results. As there are 6 existing lithopone samples, and 10 additional samples are proposed.

After the results are received, the required number of samples required for characterization will be confirmed using the additional data.

TABLE B-1

Estimate of Number of Samples Needed for Slag Pile Area Waste Characterization
DePue Site
DePue, Illnois

Constituent	Frequency of Detection	Location of Maximum Detected Concentration	Maximum Detected Concentration (mg/L)	Toxicity Characteristic Criteria[1] (mg/L)	Used to Determine Waste Pile Sampling Frequency
Metals-SPLP					
Aluminum	9/13	N-3	2.14	NE	
Antimony	4/13	N-2,W-8S,W-9S,W-11S	0.002	NE	
Arsenic	2/13	W-11S	0.07	5	
Barium	11/13	W-8S	322	100	√
Cadmium	12/13	W-11S	0.788	1	
Calcium	13/13	5-7	547	NE	
Chlorine	7/13	W-8S	230	NE	
Cobalt	12/13	W-8S	0.75	NE	
Copper	12/13	W-11S	67.9	NE	
Fluoride	6/13	W-8S	1.2	NE	
Iron	2/13	W-8S	0.02	NE	
Lead	12/13	W-10S	3.4	5	
Magnesium	12/13	W-8S	22.1	NE	
Manganese	12/13	W-8S	41.3	NE	
Mercury	1/13	W-8S	0.0003	0.2	
Nickel	11/13	W-8S	0.65	NE	
Potassium	12/13	W-9S	9.8	NE	
Selenium	4/13	W-11S	0.01	1	
Silver	5/13	N-2	0.88	5	
Sodium	13/13	W-11S	6.3	NE	
Zinc	12/13	W-8S	428	NE	

Sample Location	Depth (ft bgs)	SPLP Barium[2] (mg/L)
Regulatory Threshold (Toxicity Characteristic Criteria[1])		100
N-1	17.5 - 19	0.034
N-2	52.5 - 53.7	0.02 U
N-2	57.5 - 58.8	0.05
N-3	12.5 - 14.8	0.019
W-8S	20 - 21.5	0.029
W-8S	42.5 - 44	0.03 U
W-8S	50 - 53.7	322
W-8S	55 - 61.1	0.126
W-9S	20 - 22	0.048
W-9S	45 - 46.6	0.022
W-9S	50 - 53.7	0.053
W-10S	27.5 - 29.2	0.007
W-11S	50 - 57.3	0.016
	Average	24.8
	St. Dev.	89.3
	Variance	7974
	Count	13
	DF	12
	$t_{0.20}$ (DF)	1.356
	n	2.59

Notes:

[1] Criteria for characterizing waste as hazardous by the toxicity characteristic (40 CFR 261.24).

TABLE B-2

Estimate of Number of Samples Needed for Lithopone Ridges Area Waste Characterization
DePue Site
DePue, Illnois

Constituent	Frequency of Detection	Location of Maximum Detected Concentration	Maximum Detected Concentration (mg/L)	Toxicity Characteristic Criteria[1] (mg/L)	Used to Determine Waste Pile Sampling Frequency
Metals-TCLP					
Arsenic	1/6	C-5	0.05	5	
Barium	6/6	C-5	0.198	100	
Cadmium	6/6	W-20I	24.1	1	√
Chromium	1/6	B-4	0.02	5	
Lead	5/6	B-5	29.7	5	√
Selenium	2/6	B-4	0.07	1	
Silver	2/6	B-4,W-20I	0.006	5	

Location	Sample Depth (ft)	TCLP Cadmium (mg/L)	TCLP Lead (mg/L)
Regulatory Threshold (Toxicity Characteristic Criteria[1])		1	5
B-4	5 - 7.5	7.67	24.9
B-5	13 - 15	5.21	29.7
C-3	7.5 - 10	0.477	0.17
C-4	0 - 0.5	13.3	5.23
C-5	0.5 - 2.5	0.39	0.32
W-20I	7.5 - 10	24.1	0.04 U
	Average	8.52	10.1
	St. Dev.	9.03	13.6
	Variance	81.6	184
	Count	6	6
	DF	5	5
	$t_{0.20}$ (DF)	1.476	1.476
	n	3.14	15.7

Notes:

[1] Criteria for characterizing waste as hazardous by the toxicity characteristic (40 CFR 261.24)
U = Analyte was not detected above listed detection limit